# ICE1-8IOL-S2-G60L-V1D

## Fieldbus Module with Multiprotocol Technology and I/O-Link

**Manual**

PROFINET® IO-Link EtherNet/IP™

Your automation, our passion.

PEPPERL+FUCHS

With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"


**Worldwide**

Pepperl+Fuchs Group

Lilienthalstr. 200

68307 Mannheim

Germany

Phone: +49 621 776 - 0

E-mail: info@de.pepperl-fuchs.com

**North American Headquarters**

Pepperl+Fuchs Inc.

1600 Enterprise Parkway

Twinsburg, Ohio 44087

USA

Phone: +1 330 425-3555

E-mail: sales@us.pepperl-fuchs.com

**Asia Headquarters**

Pepperl+Fuchs Pte. Ltd.

P+F Building

18 Ayer Rajah Crescent

Singapore 139942

Phone: +65 6779-9091

E-mail: sales@sg.pepperl-fuchs.com

https://www.pepperl-fuchs.com

# 1 Introduction

## 1.1 Content of this Document

This document contains information required to use the product in the relevant phases of the product life cycle. This may include information on the following:

- Product identification
- Delivery, transport, and storage
- Mounting and installation
- Commissioning and operation
- Maintenance and repair
- Troubleshooting
- Dismounting
- Disposal

**Note**

For full information on the product, refer to the further documentation on the Internet at www.pepperl-fuchs.com.

The documentation comprises the following parts:

- This document
- Datasheet

In addition, the documentation may comprise the following parts, if applicable:

- EU-type examination certificate
- EU declaration of conformity
- Attestation of conformity
- Certificates
- Control drawings
- Instruction manual
- Other documents

## 1.2 Manufacturer

| |
|---|
| Pepperl+Fuchs Group<br>Lilienthalstraße 200, 68307 Mannheim, Germany |
| Internet: www.pepperl-fuchs.com |

## 1.3 Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismounting lies with the plant operator.

Only appropriately trained and qualified personnel may carry out mounting, installation, commissioning, operation, maintenance, and dismounting of the product. The personnel must have read and understood the instruction manual and the further documentation.

Prior to using the product make yourself familiar with it. Read the document carefully.

## 1.4 Symbols Used

This document contains symbols for the identification of warning messages and of informative messages.

### Warning Messages

You will find warning messages, whenever dangers may arise from your actions. It is mandatory that you observe these warning messages for your personal safety and in order to avoid property damage.

Depending on the risk level, the warning messages are displayed in descending order as follows:

**Danger!**

This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.

**Warning!**

This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.

**Caution!**

This symbol indicates a possible fault.

Non-observance could interrupt the device and any connected systems and plants, or result in their complete failure.

### Informative Symbols

**Note**

This symbol brings important information to your attention.

### Action

This symbol indicates a paragraph with instructions. You are prompted to perform an action or a sequence of actions.

# 2 Product Description

## 2.1 Use and Application

The ICE1-8IOL-* modules function as an interface in an industrial fieldbus system. They enable communication between a central controller at the control level and the decentralized sensors and actuators at the field level. The resulting potential line or ring topologies that can be achieved enable reliable data communication and a significant reduction in the amount of wiring required, and therefore in the costs for installation and maintenance. Simple and quick extension is also possible.

The ICE1-8IOL-* series modules have a rugged metal housing made of die-cast zinc. Due to the fully encapsulated device housing, the module electronics are protected against environmental influences and can be used in a wide range of temperatures. Despite the rugged design, the modules have compact dimensions and a low weight. They are especially suitable for use in machines and plants with a moderate I/O concentration on distributed assemblies.

### Multiprotocol (EtherNet/IP, PROFINET)

The multiprotocol modules allow you to select different protocols for communication within a fieldbus system. As a result, multiprotocol modules can be integrated into different networks without the need to obtain specific modules for each protocol. Thanks to this technology, you can also use one module in different environments.

Using rotary coding switches in the lower area of the modules, you can conveniently and easily set both the protocol and the address of the module, provided that the protocol to be used supports this. If you have chosen a protocol and started the cyclic communication once, the module remembers this setting and uses the selected protocol from this point on. To use another supported protocol with this module, perform a factory reset.

### Input/Output Channels for the Field Level

For the field level, the modules have the following input/output channels

- 8 IO-Link master ports
  - 4 IO-Link master ports, class A
  - 4 IO-Link master ports, class B

If one or more of the IO-Link ports are not required, these can also be freely configured as digital inputs or outputs (SIO mode).

- 4 hardwired digital inputs
- 4 configurable digital outputs (instead of the voltage outputs of class B master ports on pin 2)

### IO-Link Characteristics of the Modules

The modules support IO-Link Standard V1.1.

- Parametrization of IO-Link devices in PROFINET using Siemens IO_LINK_DEVICE function blocks for Step 7 and the TIA Portal

8 x IO-Link master ports

- 4 class A connections with an additional hardwired digital input at pin 2 of the I/O port.
- 4 class B connections with a galvanically isolated auxiliary power supply for up to 2 A per port at pins 2 and 5 with a total current of 8 A.
- The auxiliary power supply can be configured as a digital output.

IO-Link connections

- 5-pin M12 connector

Parameter storage

- The Parameter Storage function stores and monitors the parameters of the IO-Link device and the IO-Link master.

- This function makes it possible for you to easily replace the IO-Link device or the IO-Link master.
  This is possible from IO-Link specification V1.1 onward and only if the IO-Link device and the IO-Link master support the function.

IO-Link device parameterization

- The IO-Link devices can be parameterized in the PROFINET protocol using the Siemens IO_LINK_DEVICE function block for STEP 7 and the TIA Portal.

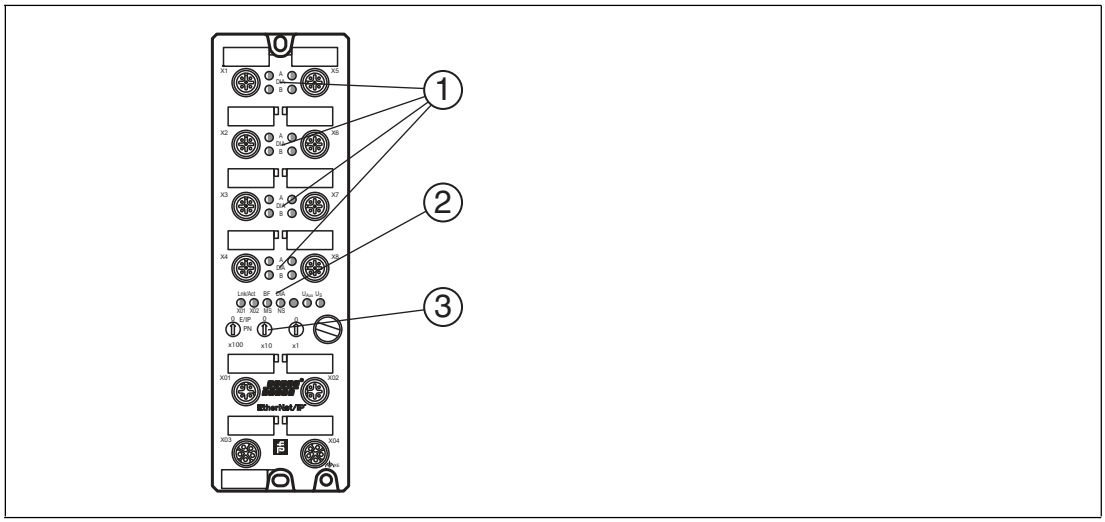
## Special Product Features

- **Rugged design:**
  Connectivity options for the module series include the widespread M12 connector with A coding for I/O signals and D coding for the network. In addition, the connectors are color-coded to prevent users from using the wrong ports. The output circuits are galvanically isolated from the rest of the network and the sensor electronics. Controllers are therefore reliably protected against noise.
- **Integrated web server:**
  Network parameters such as IP address, subnet mask, and gateway can be adjusted via the integrated web server. The modules support the communication protocols BOOTP and DHCP for automated assignment of network parameters via the corresponding servers.
  You can read the parameters of the IO-Link device via the integrated web server and write new parameters to the modules in single-write mode. Single-write mode does not activate the automatic parameter storage mechanism.
- **Force Mode**
  In Force Mode, the module ports can be temporarily configured as digital inputs/outputs or IO-Link ports. The configuration applies until the module is next switched off.
  "Force Mode" allows the simulation of process data at the digital inputs/outputs without the need to connect sensors and actuators. This means that you can test an application in advance without a full physical application. It is possible to simulate input switching states or to switch outputs even without a controller. This feature makes machine commissioning simpler and quicker and can be used to test new production plants.
- **Integrated network switch:**
  The integrated two-port Ethernet switch of the modules allows you to set up a line topology or a ring topology for the EtherNet/IP network or PROFINET network. The additional DLR or MRP protocol allows you to design a highly available network infrastructure.
- **Redundancy function:**
  The module firmware supports the redundancy function DLR (Device Level Ring) or MRP (Media Redundancy Protocol) for ring topologies. This means that if the connection is interrupted, the modules switch immediately to an alternative ring segment and thus ensure interruption-free operation. The supported DLR class is "beacon-based" in accordance with the EtherNet/IP specification.
- **Fail-safe function:**
  The modules provide a fail-safe function. You can therefore choose the behavior of each individual output channel in the event of an interruption or a loss of communication.
- **QuickConnect:**
  QuickConnect allows the modules to record the communication in an EtherNet/IP network especially quickly through an accelerated boot-up process. This allows you to switch tools faster, for example.
- **S2 system redundancy:**
  S = single network access point
  2 = switching between two application relationships is possible
  The S2 system redundancy uses a system from a PROFINET device that is connected to two redundant PROFINET controllers. This arrangement allows the additional controller to take over the IO data exchange connection if the connection to the primary controller fails.
  Normally, a connection failure to the main controller triggers the switch to an additional controller. A manual switch can be forced via the additional controller.

2022-02

## 2.2 Indicators and Operating Elements

### ICE1-8IOL-S2-G60L-V1D




1 Channel indicator LED
2 Status indicator LED
3 Rotary switch

**Note**

The LEDs in the lower area of the Ethernet IO module have different names and functions depending on the selected protocol. The following LED descriptions are therefore divided into a general part (1), which is valid for all protocol settings, and LED descriptions for a specific protocol setting (2).

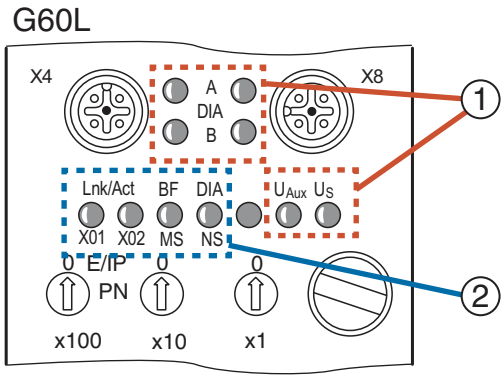



Figure 2.1

## Indicators—General Part

Description for LED A, B, DIA, $U_S$, $U_{Aux}$

| LED | Function |
|---|---|
| DIA<br>LED A (for each of X1 - X8 A) | Red: peripheral error (sensor/actuator overload or short circuit)<br>**SIO mode**<br>Yellow: channel A status (pin 4) is "on"<br>Off: no error, not connected<br>**IO-Link mode**<br>Green: IO-Link communication present<br>Flashing green: no IO-Link device connected<br>Off: not configured for IO-Link |
| DIA<br>LED B (for each of X1 – X8 B) | Red: peripheral fault (sensor and actuator overload or short circuit at line L+ (pin 1))<br>**SIO mode**<br>White: channel B status (pin 2) is "on"<br>Red: overload or short circuit at C/Q (pin 4) line<br>Off: no error, not connected<br>**IO-Link mode**<br>Red: IO-Link COM mode: IO-Link communication error or overload or short circuit at C/Q (pin 4) line<br>Flashing green: no IO-Link device connected<br>Off: not configured for IO-Link |
| LED $U_S$ | Green: voltage 19 V ≤ $U_S$ ≤ 30 V<br>Red: voltage $U_S$ < 19 V or $U_S$ > 30 V |
| LED $U_{Aux}$ | Green: voltage 19 V ≤ $U_{Aux}$ ≤ 30 V<br>Red: voltage $U_{Aux}$ < 19 V or $U_L$ > 30 V<br>Red alert is only possible if, for EtherNet/IP, the option "Report $U_{Aux}$ supply voltage fault" is enabled in "General Diagnostic Settings" or, for PROFINET, the option "$U_{Aux}$ supply diagnosis" is enabled in "Global Diagnostic Parameters." |

Table 2.1

## EtherNet/IP indicators

E/IP areas: relevant LEDs Lnk/Act X01, Lnk/Act X02, MS, NS

| LED | Function |
|---|---|
| LED Lnk/Act X01<br>LED Lnk/Act X02 | Green: connected to an Ethernet node<br>Flashing yellow: data exchange with an IO device<br>Off: no connection |
| LED MS | Green: module ready for operation<br>Flashing green: missing configuration<br>Flashing red/green: self-test<br>Red: non-recoverable, serious error<br>Flashing red: minor recoverable error (e.g., incorrect configuration)<br>Off: module switched off |
| LED NS | Green: module has at least one connection<br>Flashing green: module has no connections. IP address is available<br>Red/green: module is performing a self-test<br>Red: module has determined that the assigned IP address already exists<br>Flashing red: the connection has timed out or been interrupted<br>Off: module is turned off or does not have an IP address |

Table 2.2

2022-02

## PROFINET Indicators

P area: relevant LEDs Lnk/Act X01, Lnk/Act X02, BF, DIA

| LED | Function |
|---|---|
| LED Lnk/Act X01<br>LED Lnk/Act X02 | Green: connected to an Ethernet node<br>Flashing yellow: data exchange with an IO device<br>Off: no connection |
| LED BF | Red: no configuration, slow or no physical connection<br>Flashing red: link exists but no communication link to the PROFINET controller is available<br>Off: no error |
| LED DIA | Red: PROFINET diagnostic alarm active<br>Flashing red (1 Hz): time-out or fail-safe mode is active<br>Flashing red (2 Hz) for 3 sec: DCP signal service triggered via the bus<br>Red double flashing: firmware update<br>Off: no error |

Table 2.3

### Operating Elements

| Switch | Function |
|---|---|
| Rotary switch X100 | Setting the fieldbus protocol<br>Setting the IP address[1] |
| Rotary switch X10 | Setting the IP address[2] |
| Rotary switch X1 | Setting the IP address[3] |

1. Only EtherNET/IP
2. Only EtherNET/IP
3. Only EtherNET/IP

## 2.3 Interfaces and Connections

The contact arrangements below show the front view of the plug-in area of the connectors.

### Fieldbus Connection X01, X02

**Caution!**

Risk of destruction!

Never route the power supply to the data cable.

- Connection: M12 socket, 4 pin, D-coded
- Color coding: green

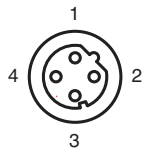



Figure 2.2 Schematic drawing of port X01, X02

| Port | Pin | Signal | Function |
|---|---|---|---|
| Ports X01, X02 | 1 | TD+ | Transmit data + |
| | 2 | RD+ | Receive data + |
| | 3 | TD- | Transmit data - |
| | 4 | RD- | Receive Data - |

Table 2.4 Assignment of port X01, X02

### Connection for IO-Link, digital inputs/outputs X1 - X8

- Connection: M12 socket, 5 pin, A-coded
- Color coding: black

**Caution!**

Risk of destruction with external sensor supply!

The module infeed for the sensor supply $U_S$ may only be provided over the specified power connection (Power X03/X04 >> $U_S$ +24 V/GND_$U_S$) for the module. It is not permitted to supply external power via the IO-Port (port X1 - X8 >> pin 1/pin 3) and this may destroy the module electronics through power feedback.

**Caution!**

Do not compromise galvanic isolation through incorrect cabling!

The sensor supply (port X5 - X8 >> pin 1/pin 3) and extended sensor supply (port X5 - X8 >> pin 2/pin 5) are galvanically isolated from each other. If the reference potentials (GND_$U_S$ – pin 3) and (GND_$U_{Aux}$ – pin 5) are connected, excessive equalization currents may flow. In this case, it is not permitted for a sensor to be connected to (port X5 - X8 >> pin 2)!

Eliminating the galvanic isolation is not recommended.

**Caution!**

Risk of destruction!

Never route the power supply to the data cable.

2022-02

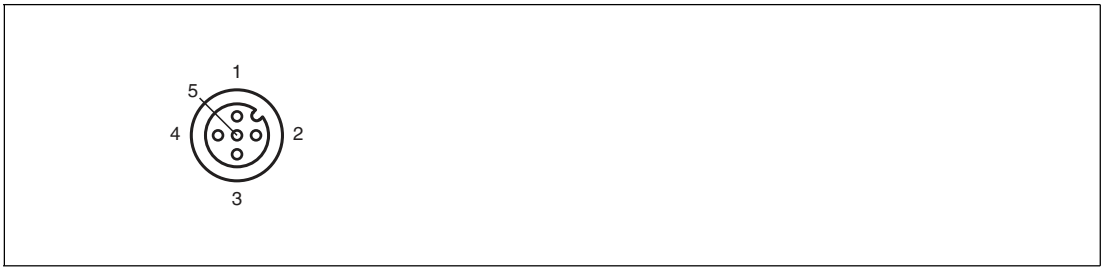



Figure 2.3 Schematic drawing of inputs/outputs 1 - 8

| Port | Pin | Signal | Function |
|---|---|---|---|
| IO-Link Class A, inputs/outputs X1 ... X4 | 1 | L+ | IO-Link sensor power supply +24 V |
| | 2 | IN-x | Channel B: digital input (type 1) |
| | 3 | L- | IO-Link sensor power supply GND_$U_S$ |
| | 4 | C/Q | Channel A: IO-Link data exchange |
| | 5 | n.c. | Not used |

| Port | Pin | Signal | Function |
|---|---|---|---|
| IO-Link Class B, inputs/outputs X5 ... X8 | 1 | L+ | IO-Link sensor power supply +24 V |
| | 2 | $U_{AUX}$ (+24 V) | Channel B: auxiliary voltage, galvanically isolated from the IO-Link/module power supply |
| | 3 | L- | IO-Link sensor power supply GND_$U_S$ |
| | 4 | C/Q | Channel A: IO-Link data exchange |
| | 5 | GND_$U_{AUX}$ | Protective earth, reference potential $U_{AUX}$ |

## Connection for Power Supply X03, X04

- Power supply with M12 power L-coded
- Color coding: gray

**Note**

For the system/sensor and actuator supply, use only power supplies that comply with PELV (protective extra-low voltage) or SELV (safety extra-low voltage). Power supplies according to EN 61558-2-6 (transformer) or EN 60950-1 (switching power supplies) fulfill these requirements.

**Caution!**

Loss of function when the system supply voltage is too low.

Ensure in all cases that the supply voltage measured at the most remote participants (sensor/actuator) does not drop below 18 V DC in terms of system supply voltage.

**Note**

Power supply connection

When connecting the power supply, ensure a separate power supply to the sensor and system via $U_s$ and auxiliary voltage via $U_{Aux}$ for e.g., actuators. Where the plant has a separate power supply concept for system current and load current, this means the sensor and system area of the Ethernet IO module can continue working even if there is a failure of the load power supply.

Where several Ethernet IO modules are connected in series, ensure the separate power supplies are connected properly $U_s$ .$U_{Aux}$.


Figure 2.4 Schematic drawing of M12 L-encoding (plug); port X03 (IN)

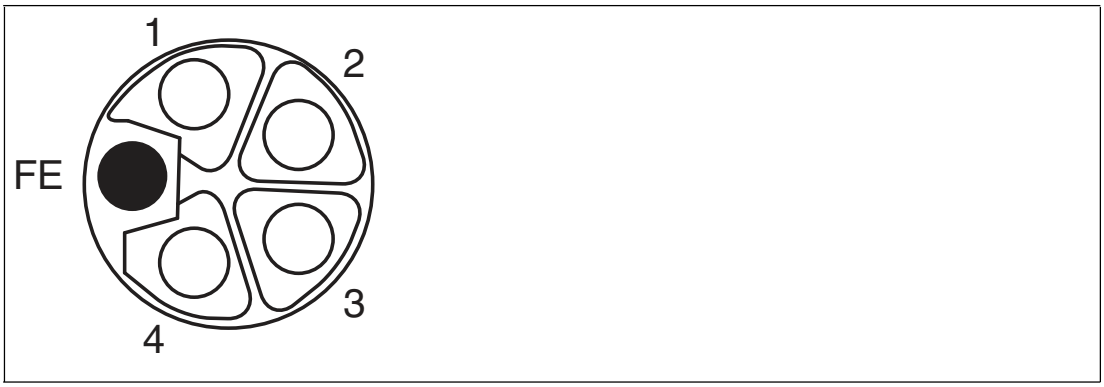



Figure 2.5 Schematic drawing of M12 L-encoding (socket); port X04 (OUT)

| Port | Pin | Signal | Function |
|---|---|---|---|
| Power supply X03, X04 | 1 | $U_S$(+24 V) | Sensor/system supply |
| | 2 | GND $U_{Aux}$ | Ground/reference potential $U_{Aux}$ |
| | 3 | GND $U_S$ | Ground/reference potential $U_s$ |
| | 4 | $U_{Aux}$ (+24 V) | Auxiliary voltage (galv. insulated) |
| | FE (5) | FE (FE) | Functional ground |

2022-02

## 2.4 Dimensions

### ICE1-8IOL-S2-G60L-V1D

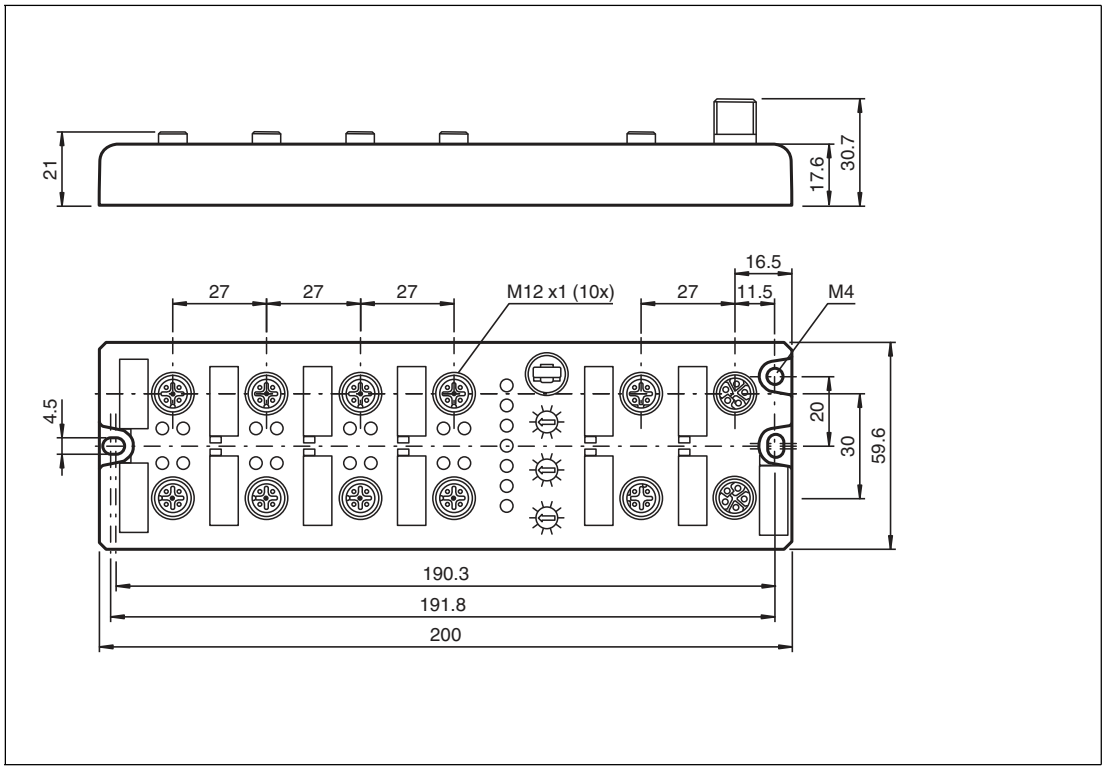



Figure 2.6

# 3 Installation

## 3.1 General Information

Install the module with two M6x25/30 size screws on a level surface. The required torque is 1 Nm. Use washers according to DIN 125. For the installation holes, use a spacing of 237.3 mm to 239.7 mm.

**Note**

Power supply connection

When connecting the power supply, ensure a separate power supply to the sensor and system via $U_s$ and auxiliary supply via $U_{Aux}$ for e.g., actuators. Where the plant has a separate power supply concept for system current and load current, this means the sensor and system area of the Ethernet IO module can continue working even if there is a failure of the load power supply.

Where several Ethernet IO modules are connected in series, ensure the separate power supplies are connected properly $U_s$ .$U_{Aux}$.

**Note**

To dissipate interference currents and the EMC resistance, the modules use a short circuit to ground with an M4 thread. This is marked with the symbol for grounding and the label "XE."

**Note**

Connect the module using a low-impedance connection with the reference ground. In the case of a grounded mounting surface, you can connect the module directly via the fixing screws.

**Note**

For non-grounded mounting surfaces, use a ground strap or a suitable FE conductor. Connect the ground strap or FE conductor to the grounding point using an M4 screw and place a washer and a serrated washer under the fixing screw if possible.

**Note**

Use a suitable UL-certified cable (CYJV or PVVA). To program the controller, please consult the manufacturer information and use only the appropriate accessories.

**Note**

For UL application:

Approved only for indoor use. Please observe the maximum altitude of 2000 meters. Approved up to a maximum of pollution degree 2.

**Warning!**

Terminals, the housing of field-wired terminal boxes or components may exceed a temperature of 60 °C.

**Warning!**

Use temperature-resistant cables with the following properties:

Heat resistant up to at least 96 °C.

# 4 Commissioning, Protocol Setting

## 4.1 Protocol Setting

### Multiprotocol

You can use the multiprotocol modules to select various protocols for communication within a fieldbus system. This allows you to integrate the multiprotocol modules into different networks without having to obtain a specific module for each protocol. This technology also allows you to use the same module in different environments. Using the rotary switches on the front of the modules, you can easily and conveniently set the protocol and address of the module, provided that the protocol to be used supports this. Once you have selected a protocol and started the cyclical communication, the module recognizes these settings and uses the selected protocol from this point on. To use another supported protocol with this module, perform a factory reset.

### Setting a Protocol

Multiprotocol modules have a total of three rotary switches. Move the first rotary switch X100 to the relevant switch position to set the protocol. If you use EtherNet/IP, set the last octet of the IP address using the rotary switches (X100, X10, X1).

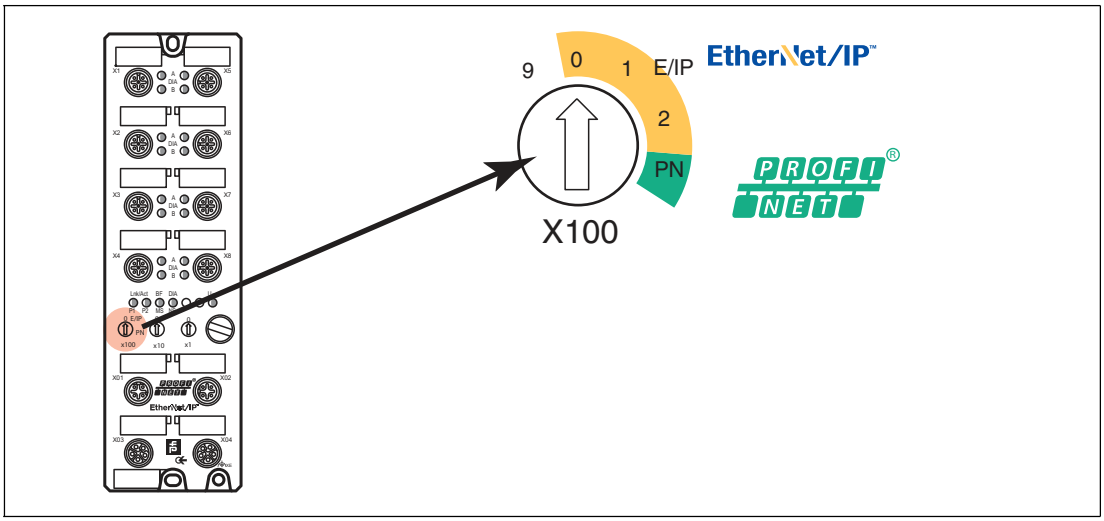



Figure 4.1 Rotary switch X100

**Assigning the Protocol Using the Rotary Switches**

| Protocol | X100 | X10 | X1 |
|---|---|---|---|
| EtherNet/IP | 0 – 2 | 0 – 9 | 0 – 9 |
| PROFINET | P | - | - |

In its delivered state, the module does not contain any protocol settings. In this case, simply select the desired protocol. To use a modified rotary switch setting (protocol setting), you must perform a power cycle or a "Reset" via the web interface. Once you have set the protocol using the rotary switches, the module saves these settings as soon as it starts a cyclical communication. You can no longer change the protocol using the rotary switch from this point on. To change the protocol, perform a factory reset first.

If you set the rotary coding switch to an invalid position, the device signals this with a flash code: the BF/MS/ERR LED flashes red three times.

The IP address can be changed depending on the selected protocol.

2022-02

## EtherNet/IP

If you use EtherNet/IP as the protocol, use rotary switch X100 to set the value 100 as the last octet of the IP address for the module. You can use rotary switch X100 to set a value of 0 to 2 for the IP address. You can use rotary switches X10 and X1 to select values between 0 and 9. You can use rotary switch X10 to configure position 10 of the last octet of the IP address. You can use rotary switch X1 to configure position 1 of the last octet of the IP address.

The default setting for the first three octets of the IP address is 192.168.1.

**Example**: Rotary switch settings 2 (X100), 1 (X10), and 0 (X1) result in an IP address of 192.168.1.210 for EtherNet/IP.

## PROFINET

If you use PROFINET as the protocol, only set rotary switch X100 to the value "P."

## Factory Settings

A factory reset erases any changes you have made to settings, etc. and restores the factory settings. The saved protocol selection is also reset.

To perform a factory reset, set rotary switch X100 to 9, rotary switch X10 to 7, and rotary switch X1 to 9. Then switch the module off and on again. The factory settings are restored after 10 seconds.

To select a new protocol, follow the instructions in this chapter.

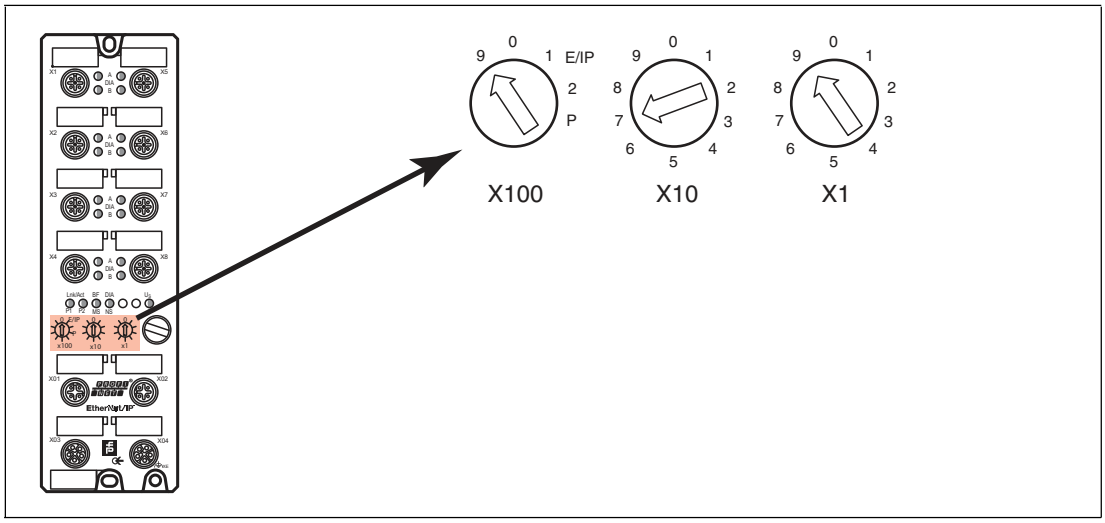



Figure 4.2 Restoring factory settings: X100 = 9, X10 = 7, X1 = 9

**Caution!**

Destruction of the Operating System

When restoring the factory settings, ensure that the module is connected to the voltage supply and switched on for **at least** 10 seconds. If it has been on for less than 10 seconds, the operating system may be destroyed. The module would then need to be sent to Pepperl+Fuchs for repair.

# 5 Commissioning for PROFINET

## 5.1 Preparation

The configuration and commissioning process for the modules described over the following pages was performed using TIA Portal V15 project planning software from SIEMENS. When using a control system from a different controller provider, please refer to the corresponding documentation.

### GSDML File

To configure the modules in the control system, you need a GSD file in XML format. You can download this file from our website at https://www.pepperl-fuchs.com.

The file for the PROFINET modules is named GSDML-V2.3*-Pepperl-Fuchs-ICE1-S2-yyyym-mdd.xml. In this case, **yyyymmdd** is the issue date of the file.

Integrate the GSDML file into the TIA Portal using the GSD manager via the main menu "Options > Manage general station description files (GSD)." The modules with a PROFINET interface are then available in the hardware catalog.

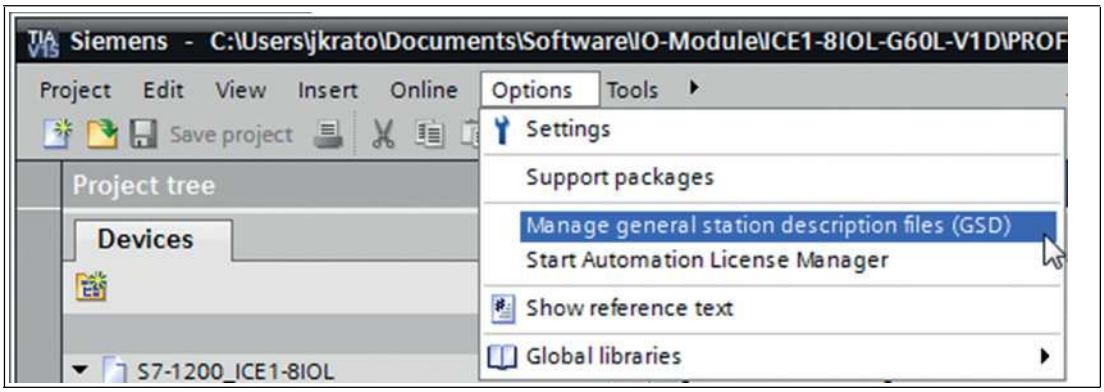



Figure 5.1

### MAC IDs

The modules have three assigned MAC IDs when they are delivered. These are unique and cannot be changed by the user.

The first assigned MAC ID is printed on the module.

### SNMP

The modules support the SNMP Ethernet network protocol (Simple Network Management Protocol). The information from the network management system is displayed in accordance with MIB-II (Management Information Base), which is defined in RFC 1213.

Passwords:

Read community: `public`

Write community: `private`

## 5.2 Configuration Example

The configuration and commissioning process for the modules described over the following pages was performed using TIA Portal V15 project planning software from SIEMENS. The configuration is based on the example of an ICE1-8IOL-S2-G60L-V1D module. For other module versions, configuration is carried out with a few minor changes.

2022-02

**Note**

To configure a module in the control system, you need a GSDML file.

## 5.2.1 Integration of PROFINET IO Modules in the TIA Portal

As an example, the following is an explanation of how to configure an Ethernet IO module as a PROFINET type in the TIA portal, based on the ICE1-8IOL-S2-G60L-V1D module.

1. Install the GSDML file for the desired module in the TIA Portal.

   ↳ Once the GSDML file for the PROFINET modules has been installed, the modules are available in the TIA portal hardware catalog.

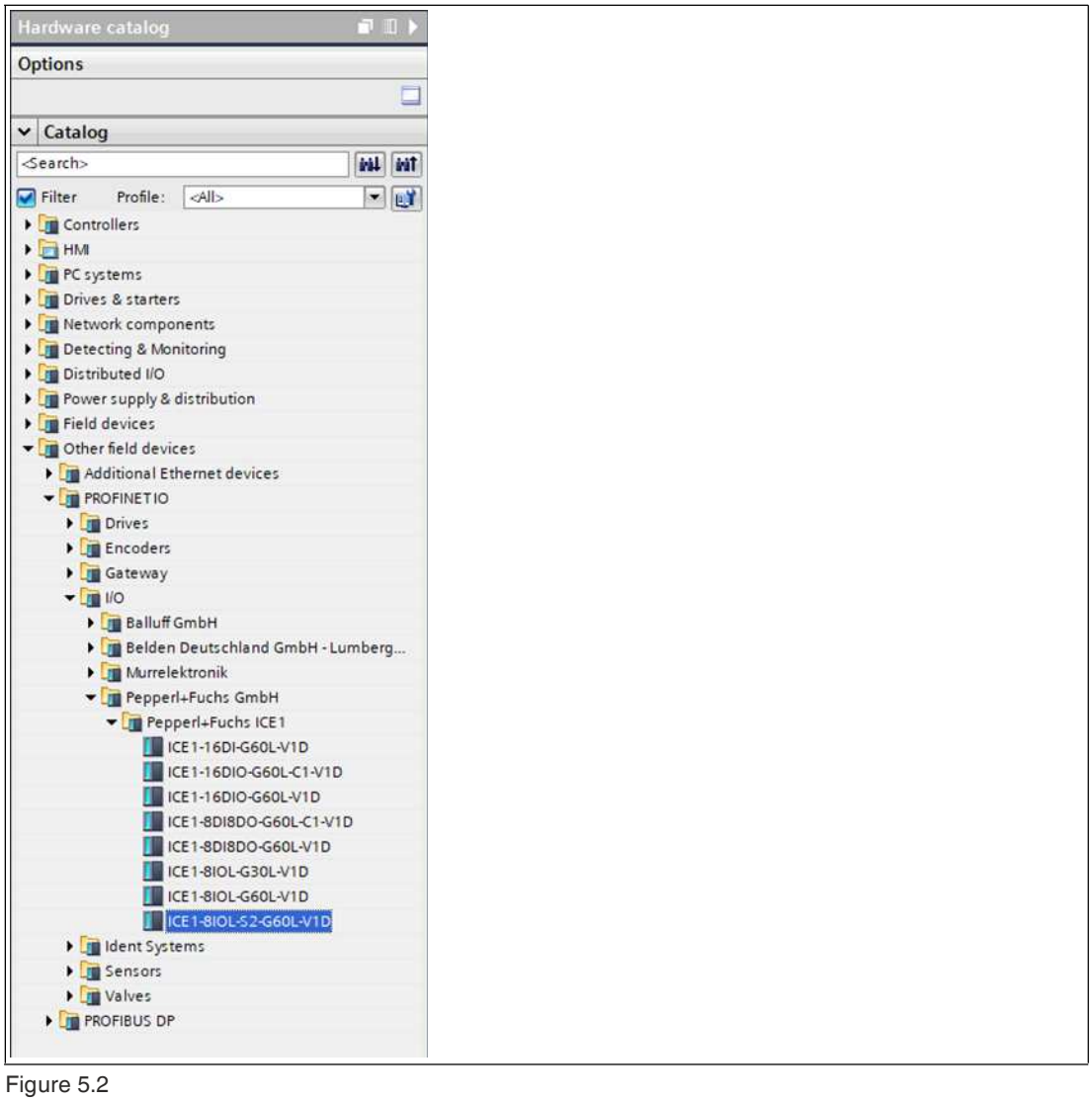



Figure 5.2

2. Double-click on the desired module and select the corresponding PROFINET interface.

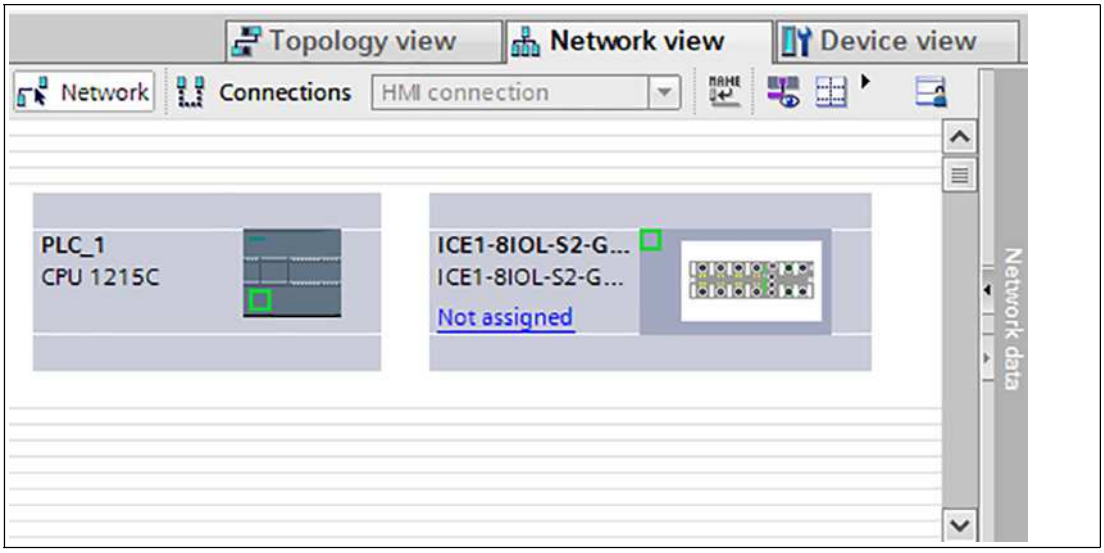



Figure 5.3

↳ Slot 1 is automatically occupied with the status/control module, which cannot be deleted. The remaining subslots are configured as "inactive" by default and can be changed.

Device overview

| Module | Fail-safe | Rack | Slot | I address | Q address | Type | Article number |
|---|---|---|---|---|---|---|---|
| ICE1-8IOL-S2-G60L-V1D | | 0 | 0: PROFINET Interface | | | ICE1-8IOL-S2-G60L... | 70103603 |
| PN-IO | | 0 | 0: PROFINET Interface X1 | | | ICE1-8IOL-S2-G60L... | |
| IO-Link Master_1 | | 0 | 1: IO System | | | IO-Link Master | |
| Status/Control Module | | 0 | 1: IO System 1 | | | Status/Control Mod... | |
| Inactive (A/B) | | 0 | 1: IO System 1.2: Port X1 | | | Inactive (A/B) | |
| Inactive (A/B)_1 | | 0 | 1: IO System 1.3: Port X2 | | | Inactive (A/B) | |
| Inactive (A/B)_2 | | 0 | 1: IO System 1.4: Port X3 | | | Inactive (A/B) | |
| Inactive (A/B)_3 | | 0 | 1: IO System 1.5: Port X4 | | | Inactive (A/B) | |
| Inactive (A/B)_4 | | 0 | 1: IO System 1.6: Port X5 | | | Inactive (A/B) | |
| Inactive (A/B)_5 | | 0 | 1: IO System 1.7: Port X6 | | | Inactive (A/B) | |
| Inactive (A/B)_6 | | 0 | 1: IO System 1.8: Port X7 | | | Inactive (A/B) | |
| Inactive (A/B)_7 | | 0 | 1: IO System 1.9: Port X8 | | | Inactive (A/B) | |

Figure 5.4

↳ The following submodule profiles are available for configuration of an 8IOL module:

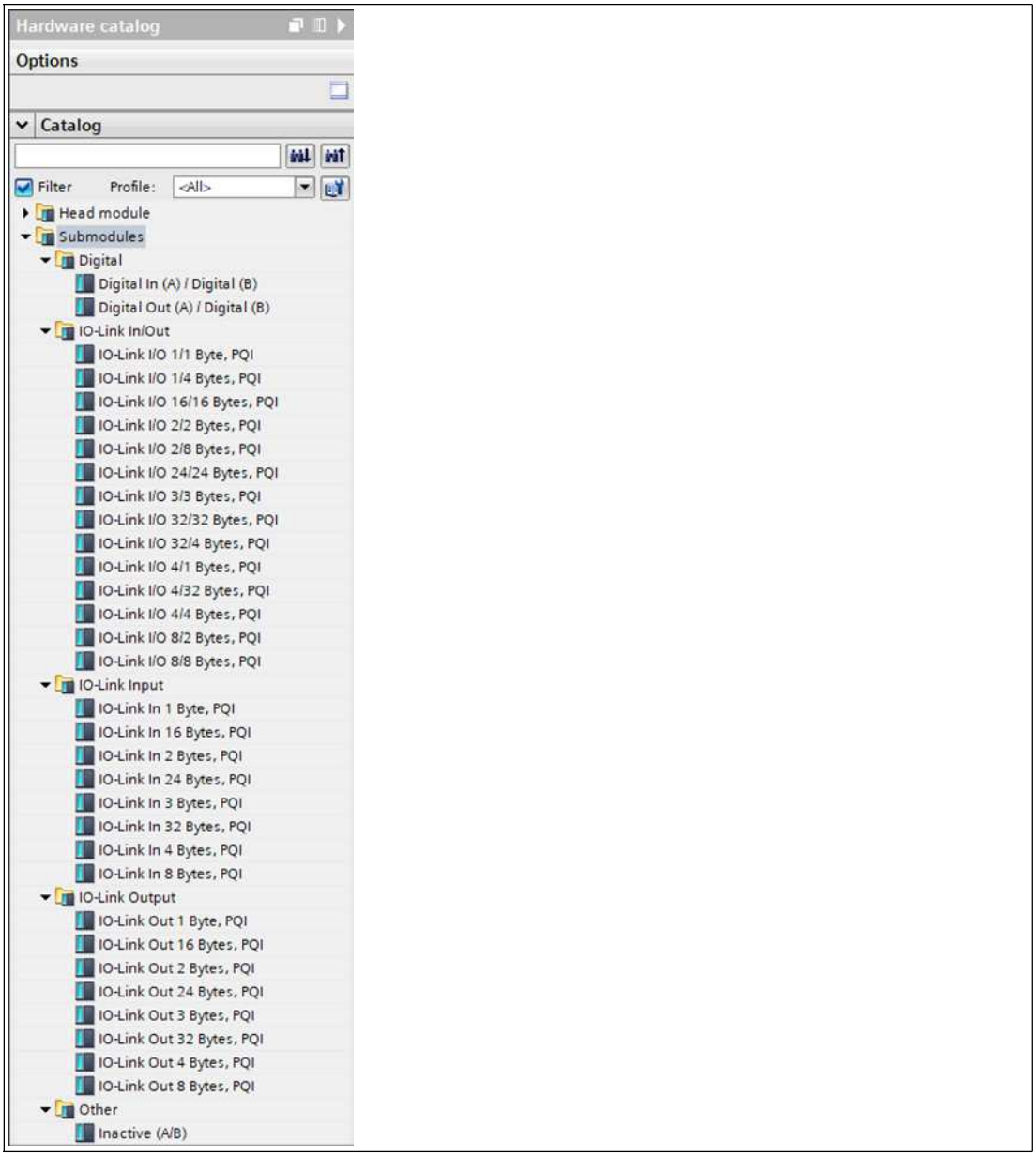



Figure 5.5

## 5.2.2 Assigning a Unique Device Name in the Control System

PROFINET IO devices are addressed in the PROFINET network via a unique device name. This can be freely assigned by the user but must appear only once in the network.

1. Select slot 0 in the module device view and assign an appropriate module name. In this example, the product identifier is "ICE1-8IOL-S2-G60L-V1D."

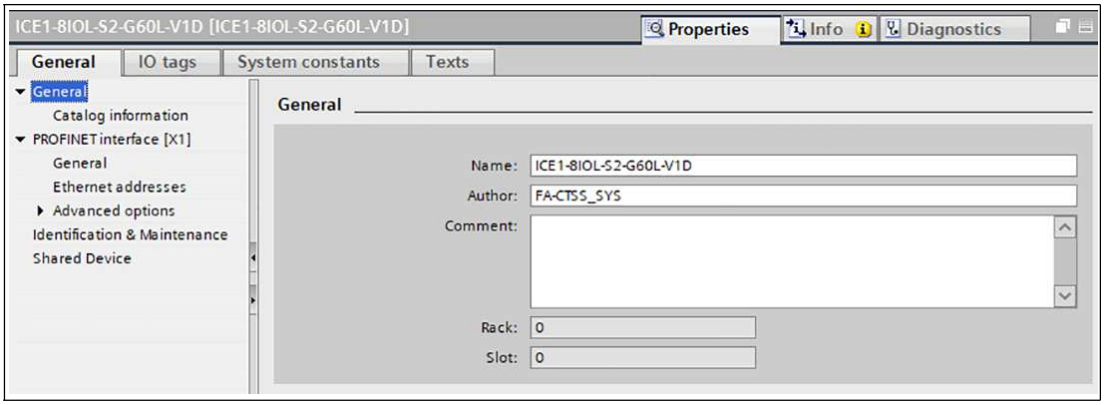



Figure 5.6

2. Check the automatically assigned IP address in "PROFINET interface [x1] -> Ethernet addresses."

3. Check whether the control system and module are on the same Ethernet subsystem. If necessary, change the setting.

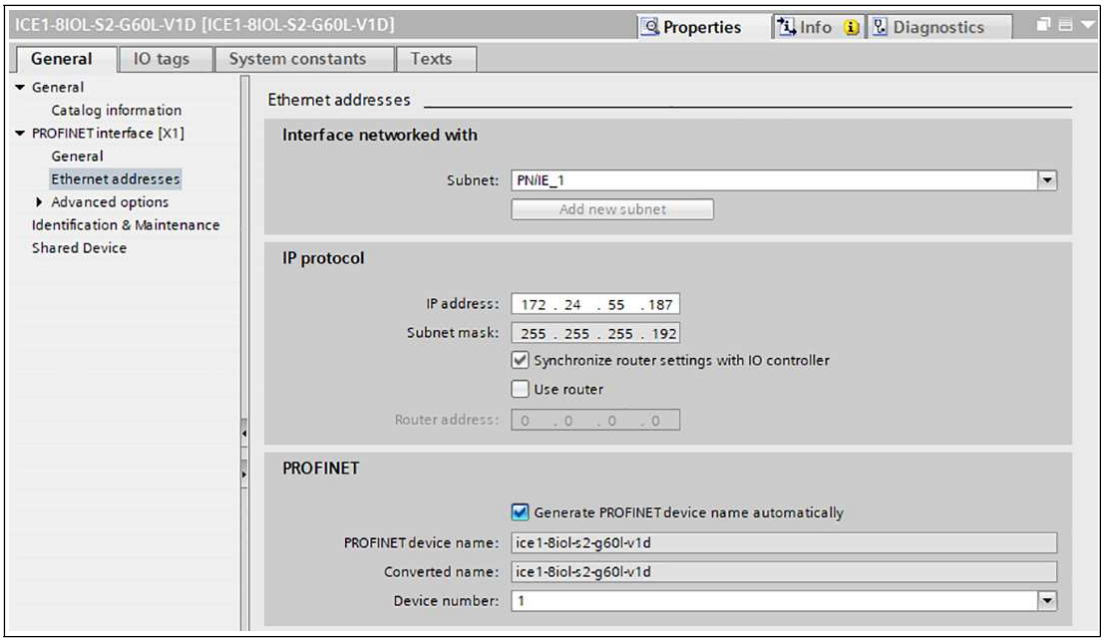



Figure 5.7

4. To use the previously assigned device name, enable the "Generate PROFINET device name automatically" option.

**Note**

For clarity, we recommend that you do not use a different device name.

### 5.2.3 Assigning the Device Name to a PROFINET IO Module

Each module must have a device name so that each node in the PROFINET network can be assigned an IP address. A node search displays all PROFINET devices that have been found.

The Ethernet IO modules have three assigned MAC IDs when they are delivered. These are unique and cannot be changed by the user. The first MAC ID is shown on the housing of the Ethernet IO module. (See between X2 and X3). Using this ID, each device can be found in the list of available nodes and assigned a device name.

1. Connect the module to the PROFINET network.
2. In "Device View," select the module "Slot 0."
3. Open the dialog "Accessible devices" via the main menu "Online -> Accessible devices ...."

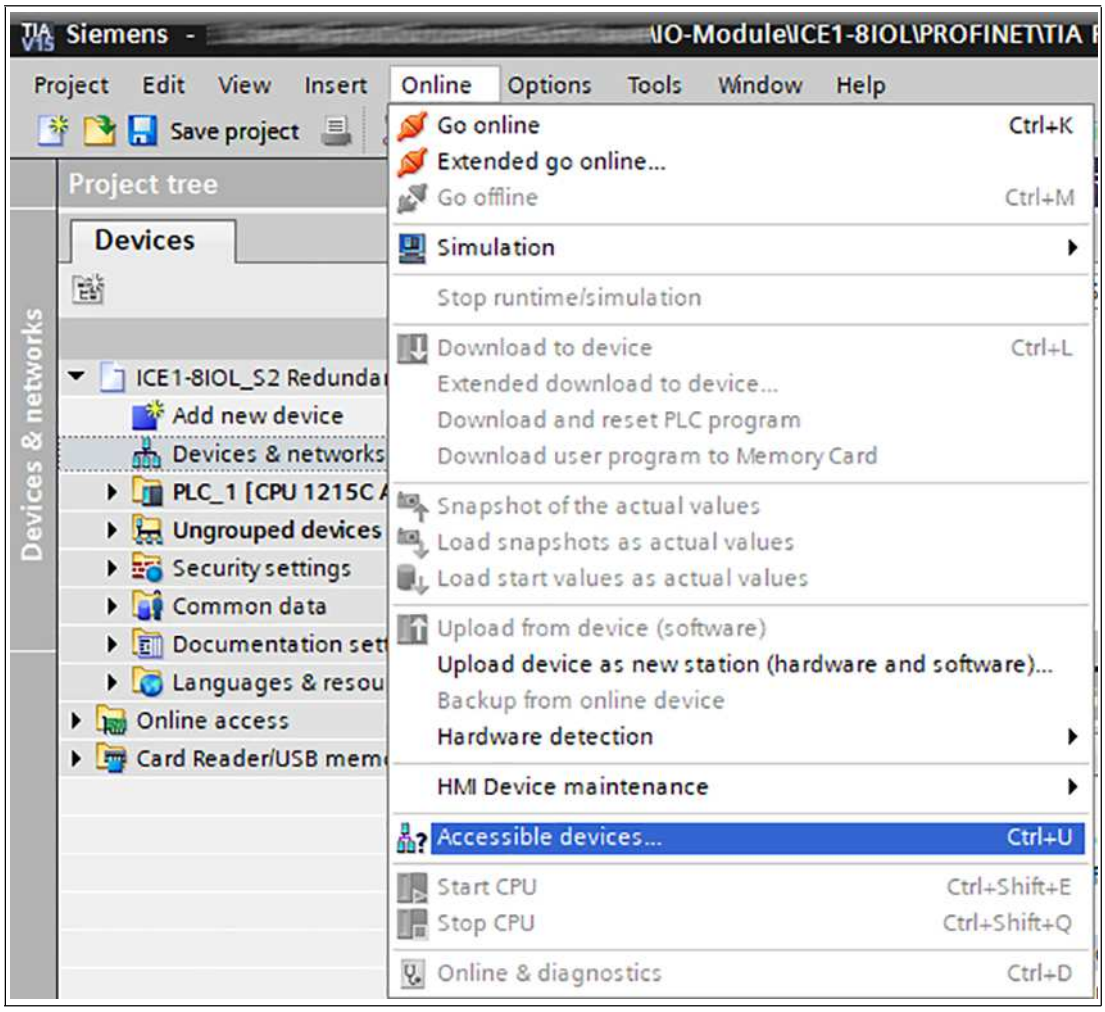



Figure 5.8

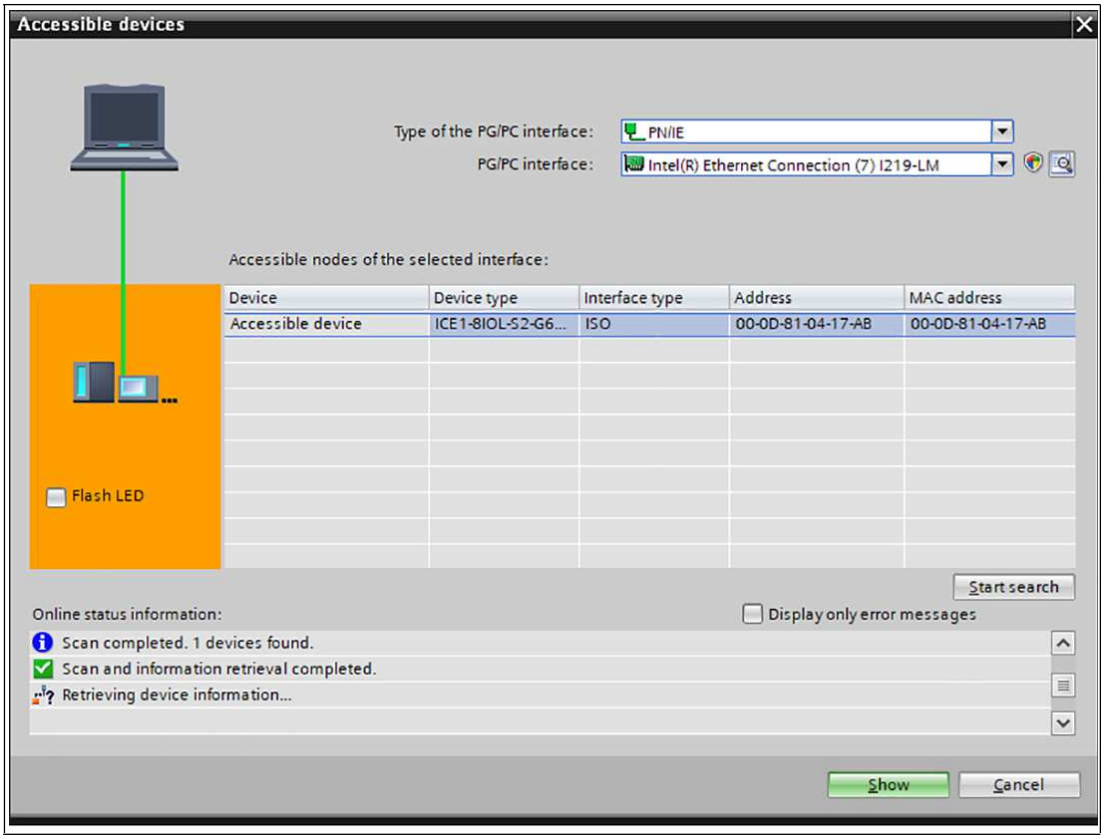



Figure 5.9

4. Select a module from those found.

↳ If the desired module is not displayed in the list of available nodes on the network, you can change the device filter and refresh the list. If the device still does not appear, check your firewall settings.

5. Assign the selected PROFINET device name to the module.

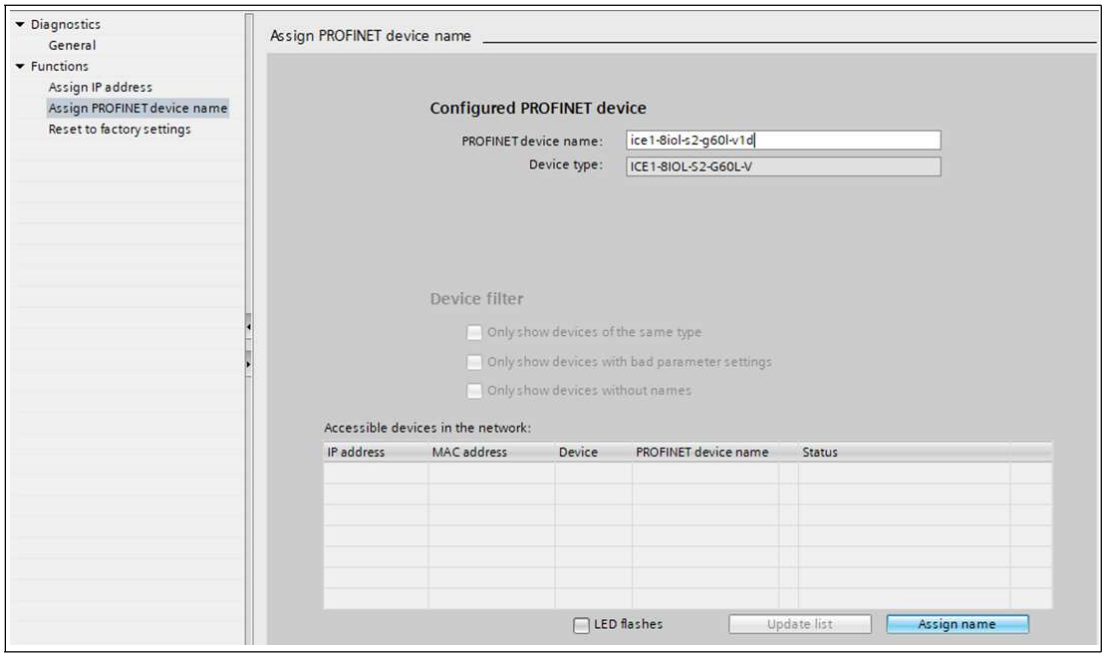



Figure 5.10

↳ If the device name was set successfully, this will be indicated by the status.

6. To complete the process, click the "Assign name" button.

## 5.2.4 Configuring the IO-Link Channels

A preconfiguration of the I/O function is automatically used for slot 1 of the rack.

By default, all channels are preconfigured as "inactive." The configurations for the IO-Link channels (C/Q or channel A/pin 4 of the IO port) in subslots 2 ... 9 (port 1 of the device corresponds to subslot 2, etc.; port 8 of the device corresponds to subslot 9) can be defined as required. The input and output addresses defined by the hardware manager can be changed.

### Deleting an IO-Link Channel Configuration

1. To delete an IO-Link channel, select the desired IO-Link channel in "Device View."

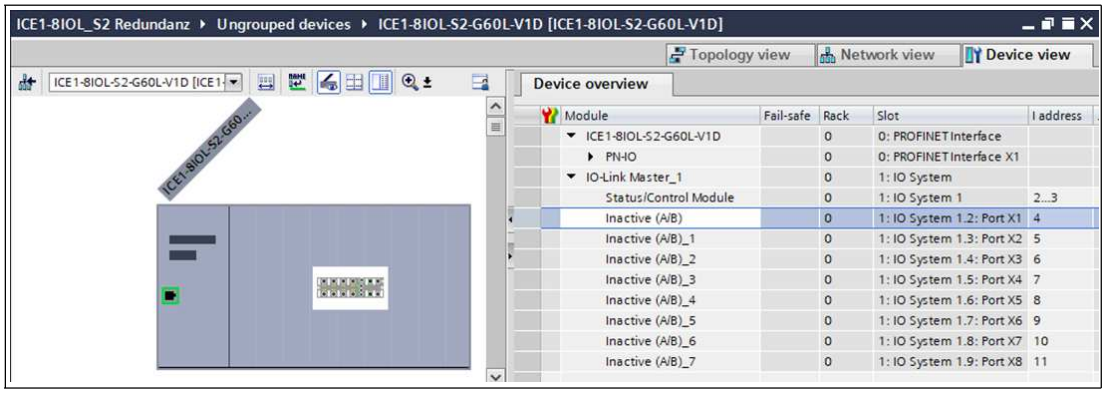



Figure 5.11

2. Right-click on this entry.

↳ The following menu appears:

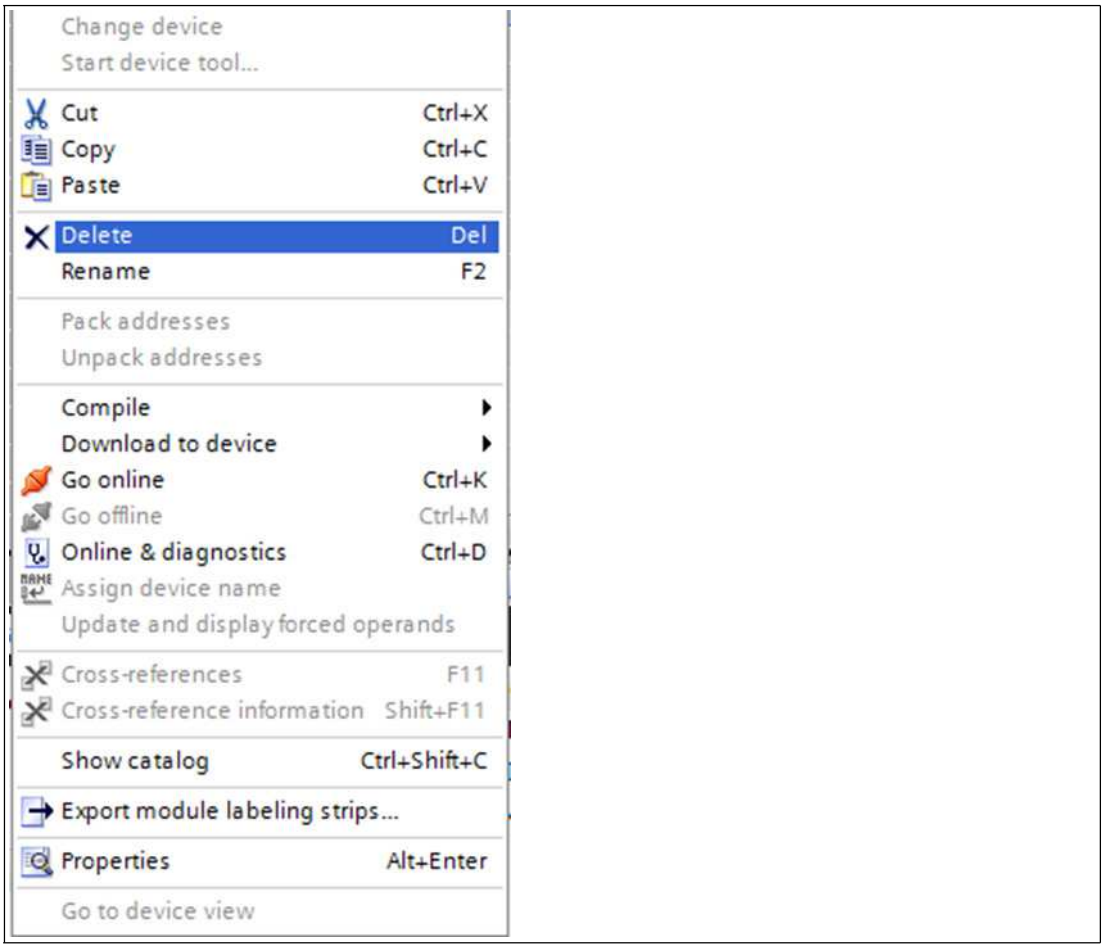



Figure 5.12

3. Select the "Delete" option. To confirm the following dialog, click "Yes."

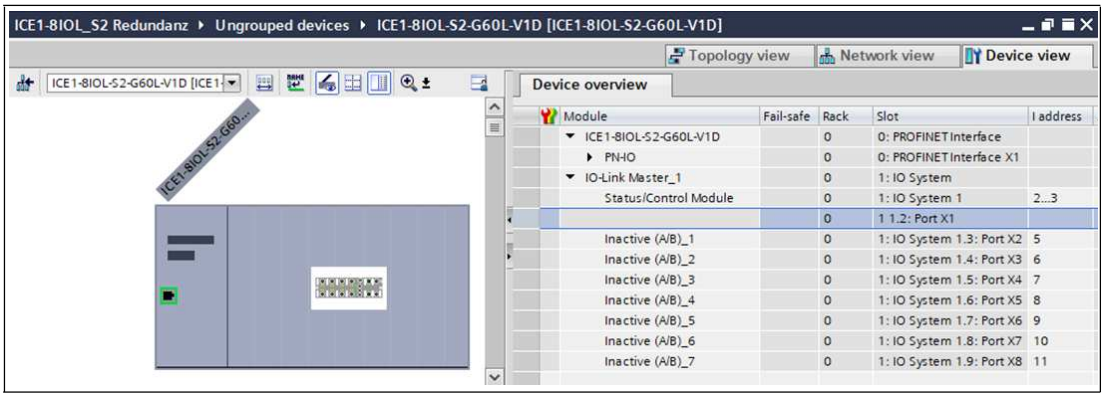
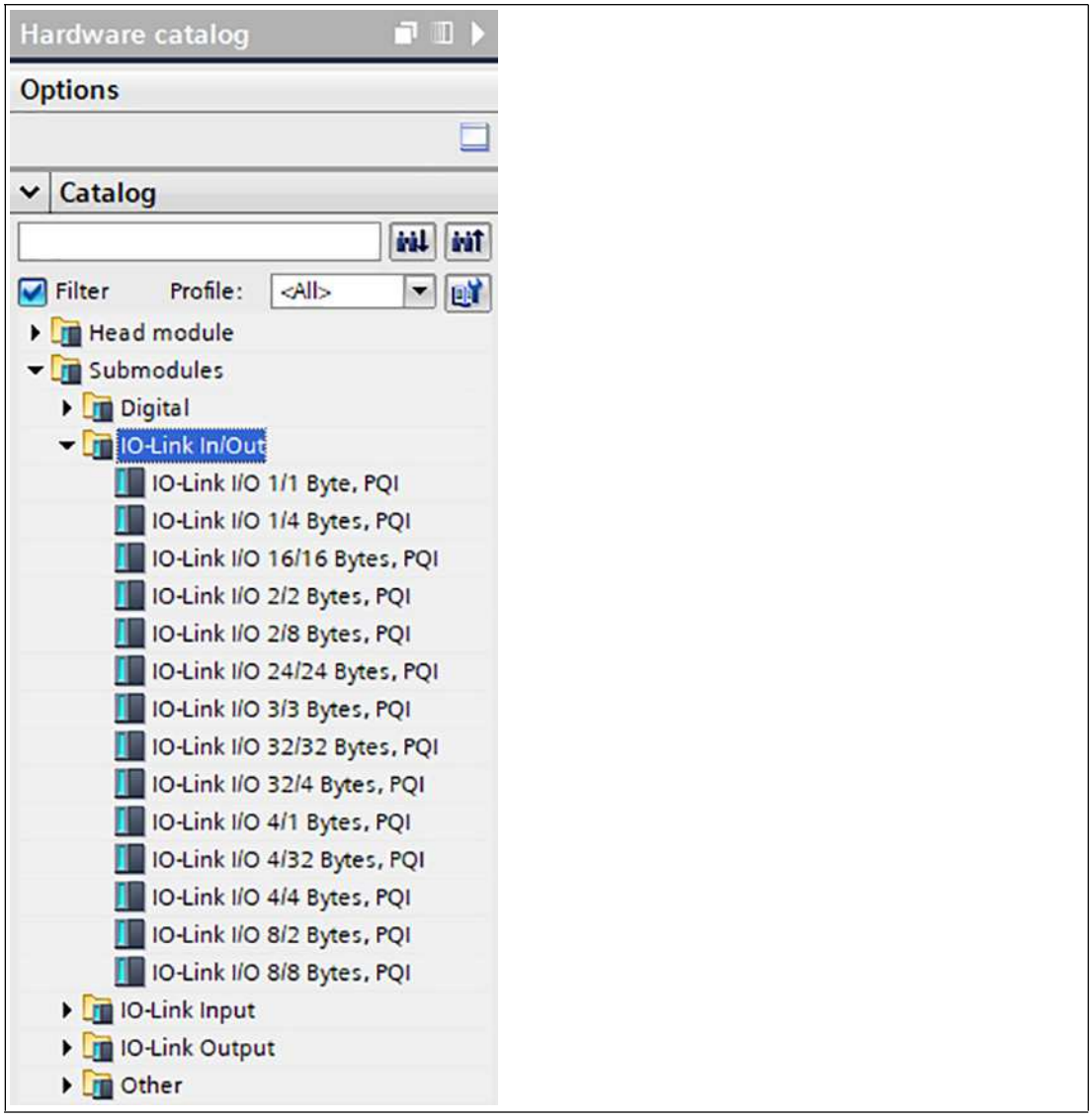



Figure 5.13

## Creating an IO-Link Channel Configuration

1. Different IO-Link communication channels (input channel, output channel or input/output channel) are available in addition to the digital input and output channels. To display a selection of options, click the appropriate folder in the hardware catalog:




2. Select the required option. To drag the configuration to a free IO-Link subslot, click and hold the left mouse button.

### The following options are available for the IO-Link C/Q channel (channel A/pin 4):

**Digital Input:** In this mode the channel works as a digital input. The IO-Link master does not attempt to independently establish communication with the connected IO-Link device.

**Note**

In case of optional COM operations, the status of the digital input signal is not updated.

**Digital Output:** In this mode the channel works as a digital output.
It is not possible to communicate with the connected device.

**Inactive:** This mode should be selected when the channel is not used.
In this case, the power supply L+ to pin 1 of the connection is disabled.

**IO-Link ... :** In this mode (COM mode), process data is exchanged from or to the device via a communication connection.
The IO-Link master automatically starts communication with the connected IO-Link device, taking into account the baud rate.
In this mode, all IO-Link functions can be used without limitation (parameterization, diagnosis, etc.).
Configuration modules with data lengths of 1 ... 32 input and/or output bytes are available.
If the IO-Link device does not have a suitable configuration module, the next largest data length must be selected.

## 5.2.5 Parameterization of the IO-Link Channels

By double-clicking the relevant IO-Link subslot in the hardware configuration and selecting the "Module parameters" tab, you can set the following parameters:

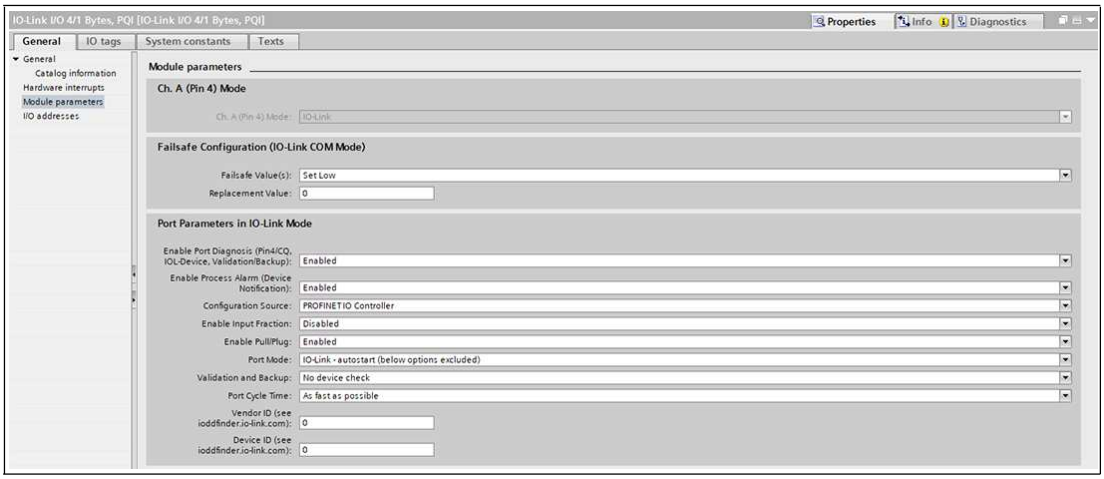



Figure 5.14

### 5.2.5.1 Fail-Safe Configuration (Outputs Only)

This option only applies to IO-Link channels in COM mode in which output data is used. In COM mode, IO data is exchanged between the IO-Link master and the IO-Link device via serial communication.

**Fail-Safe Value (COM mode)**

The following values can be selected:

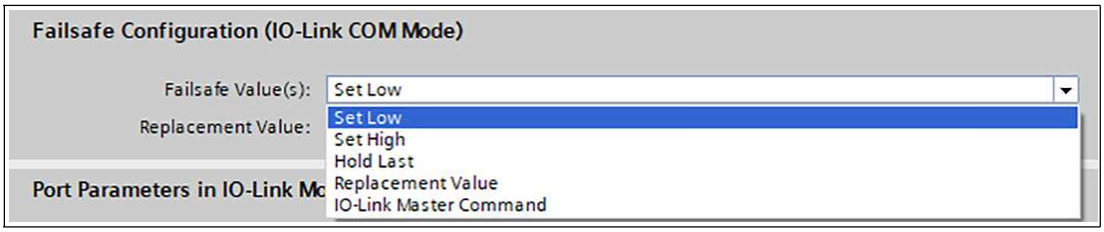



Figure 5.15

- **Set Low:**
  All bits of the output data with a value of 0 are transferred to the IO-Link device. (Default setting)
- **Set High:**
  All bits of output data with a value of 1 are transferred to the IO-Link device.
- **Hold Last:**
  The last valid output value received by the control unit is continuously and cyclically transferred to the IO-Link device.
- **Replacement Value:**
  If this option is selected, you can enter a substitute value in the following input fields, which will be continuously and cyclically transmitted to the IO-Link device.
- **IO-Link master command:**
  The "IO-Link master command" option enables the use of IO-Link-specific mechanisms for valid/invalid output process data.
  In this way, the behavior is determined by the device itself.

### 5.2.5.2 Port Parameters in IO-Link Mode

#### Enable Port Diagnosis

Enable or disable the IO-Link master port diagnosis and the IO-Link device alarms using the "Enable Port Diagnosis" option. This affects the diagnosis only in relation to the IO-Link channel (pin 4) of the IO port.

Default: Enabled

#### Enable Process Alarm (Device Notifications)

Enable or disable the IO-Link device alarm notifications using the "Enable Process Alarm" option. When this option is disabled, all "Notification" IO-Link device alarms are suppressed in the IO-Link master.

Default: Enabled

#### Configuration Source

- **PROFINET IO controller**
  The PROFINET IO controller assigns the IO-Link master port configuration.
- **Port and device configuration tool** (not yet supported)
  An external IO-Link port and IO-Link device configuration tool assigns the IO-Link master port configuration.

Default: PROFINET IO controller

## Enable Input Fraction

If the user configures a subslot module with less than the actual input data of the device, the IO-Link master sends as many IO-Link device input bytes as possible to the PLC, including the PQI byte of the subslot module. Consequently, only "0" up to (device input length - 1) octets of the input data of the device are mapped to the PROFINET process input data of the IO-Link master

If this option is disabled and the input data length does not match, a data length mismatch alarm is enabled. If a mismatch is detected in the output data, a diagnosis of the process data "mismatches" is generated regardless of the selected "Enable Input Fraction" setting.

## Enable Pull/Plug

Enable or disable the pull/plug alarms of an IOL device (add/remove submodules) using the "Enable Pull/Plug" option. The failure or return of an IO-Link device is mapped via PROFINET pull/plug alarms. This assignment is independent of the switch-on and shutdown phases.

- Plug alarms
  - **Ready to operate**: IOL device is ready
  - **COM fault**: wrong device or other problems
  - IOL device started but not ready for operation due to a fault
- Pull alarms
  **COM fault**: no IOL device

If the option is set to "Disabled," a channel diagnosis is generated when an IO-Link device is lost.

Default: Enabled

## Port Mode

- **Disabled**
  Configure an IO-Link port for later use using the "Disabled" option. If the IO-Link device is not connected, no diagnosis is generated.
- **IO-Link Autostart**
  No explicit port configuration is required with the "Plug&Play" option. Basic assignments are not required. Examples:
  - Validation and backup (test level)
  - Port cycle time
  - Manufacturer identifier
  - Device ID
- **IO-Link Manual**
  An explicit port configuration is possible for specific assignments.
  - Validation and backup (test level)
  - Port cycle time
  - Manufacturer identifier
  - Device ID

  These parameters are GSD-based and can be configured via the PROFINET engineering system.

Default: IO-Link Autostart

**Overview of Dependencies for the "Port Mode" Configuration Type**

| Feature | IO-Link Autostart | IO-Link Manual (GSD) |
|---|---|---|
| Access on process data (PD) | Yes | Yes |
| Diagnostics of port & device | Yes | Yes |
| I&M data (IM0) access | Yes | Yes |
| Device check (consolidated/real) | No | Yes |
| Backup & Restore | No | Yes |
| Device parameterization (PDCT) | No | No |
| TMG TE GmbH Device Tool V5 | Yes | Yes |
| Commissioning (online) | No | No |

Table 5.1 Port mode configuration types

## Validation and Backup

The "IO-Link Manual" port mode is required for the "Validation and Backup" option.

- **No IOL device check**
  The connected "Manufacturer identifier" and "Device ID" are not checked.
  No "Backup and Restore" of the IOL master parameter server is supported.
- **Type-compatible IOL device (V1.0)**
  Type-compatible according to IO-Link specification V1.0
- **Type-compatible IOL device (V1.1)**
  Type-compatible according to IO-Link specification V1.1; "Manufacturer identifier" and "Device ID" are checked by the IOL master
- **Type-compatible IOL device (V1.1) with "Backup and Restore"**
  Type-compatible according to IO-Link specification V1.1; "Manufacturer identifier" and "Device ID" are checked by the IOL master with "Backup and Restore." The connected IOL device must be type compatible for the "Backup and Restore" function.
- **Backup (device to master)**
  A backup (upload / from IOL device to IOL master) is performed if an IO-Link device is connected and the master has no valid data. The parameter data that is read is permanently stored on the master. If parameter data is changed on the device during runtime, the device parameter stored on the master can be updated using the `ParamDownload-Store` command (index 0x0002, subindex 0x00, value 0x05). This command sets the flag **DS_UPLOAD_REQ** on the device so that the IOL master performs an upload from the IOL device. For each new connection to an IO-Link device, the master compares the stored parameter data with the device data. If the function is not active on the device (parameter storage "locked"), the master will download the stored data onto the device where there are discrepancies. The IO-Link master can be replaced using the "Backup" function.
- **Restore (master to device)**
  Parameter data can be transferred to an IO-Link device only if parameter data is available on the IOL master parameter server and can be used for the device. When an IOL device is connected, the master compares the stored parameter data with the IOL device data. If the function is not active on the device (parameter storage "locked"), the master will download the stored data onto the device where there are discrepancies. If the master has not stored a device parameter set, nothing happens.
  The IO-Link device can be replaced using the "Restore" function.

Default: no IOL device check

| Action | IO-Link master status | IO-Link device status |
|---|---|---|
| Backup | Valid data (or deleted) | Upload flag active (valid data) |
| Backup | Invalid data (or deleted) | Upload flag not active & valid data |
| Backup | Valid data | Upload flag active & valid data |
| Restore | Valid data | Upload flag not active (data is the same) |

Table 5.2

**Note**

If the parameters were written to the IO-Link device in block mode, an IO-Link device sets the "Upload" flag independently.

### Port Cycle Time

The "IO-Link Manual" port mode is required for the "Port Cycle Time" option.

- **As fast as possible**
  For the cyclic IO data update between the IOL master and IOL device, the IO-Link master uses the maximum supported IOL device update cycle time, which is limited by the maximum supported IOL master cycle time.
- **1.6 ms, 3.2 ms, 4.8 ms, 8 ms, 20.8 ms, 40 ms, 80 ms, 120 ms**
  You can manually set the cycle time to the options provided. This option can be used for IOL device modules that are connected via inductive couplers. Inductive couplers are usually the bottleneck in the update cycle time between IOL master and IOL device. In this case, refer to the datasheet of the inductive coupler.

Default: As fast as possible

### Vendor ID

The "IO-Link Manual" port mode is required for the "Vendor ID" option.

The manufacturer identifier of the connected IOL device can be entered as a decimal value [0 ... 65535] and is used for validating type compatibility depending on the "Validation and Backup" settings.

Default: 0

### Device ID

The "IO-Link Manual" port mode is required for the "Device ID" option.

The device ID of the connected IOL device can be entered as a decimal value [0 ... 65535] and is used for validating type compatibility depending on the "Validation and Backup" settings.

Default: 0

## 5.2.6 Parameterization of the Status/Control Module

The status/control module in slot 1/subslot 1 is permanently preconfigured for each module. It contains 2 bytes of input data and 2 bytes of output data for the digital IO data plus status and control bits of the IO-Link master.

The bit assignments are described in the main chapter "Commissioning for PROFINET" in the "Bit Assignment" chapter (See chapter 5.3).

Using the status/control module, it is also possible to carry out all of the global module-specific parameterization that is not related to ports in the IO-Link COM mode.

2022-02

1. Select "Device View" (1) and the desired module (2) (in this example, slot 1 with an 8IOL module).
2. Then, in the "General" tab, select the "Module parameters" (3) area.

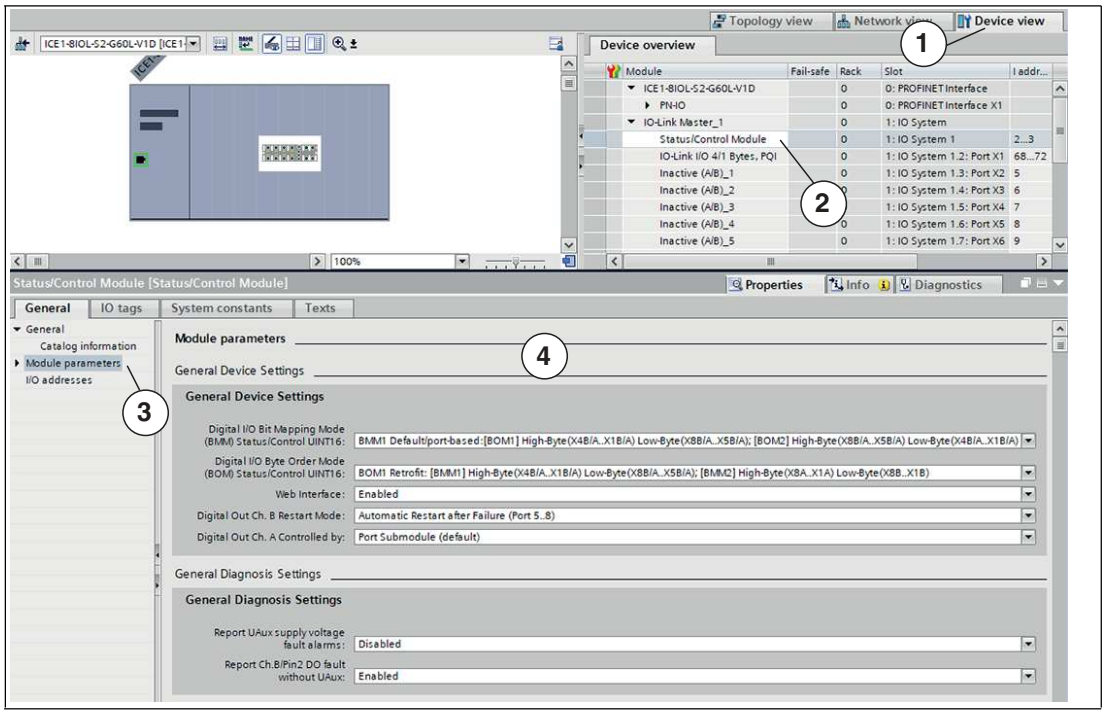



Figure 5.16

↳ You can now carry out the desired parameter settings in the dialog (4).

The following is a brief description of the individual areas for parameter setting.

### 5.2.6.1 General Device Settings

## Digital-IO Bit Mapping Mode (BMM)

Select the mapping of IO bits using the "Digital-IO Bit Mapping Mode" parameter.

- **BMM1: standard mapping**
  In "port-based" bit mapping mode 1 (BMM1), the channel A bits (C/Q, channel A/pin 4) and the channel B bits are transferred alternately in ascending order for all ports.

### Mapping for BMM1 + BOM1

| Status/control | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Bit | X4B | X4A | X3B | X3A | X2B | X2A | X1B | X1A |
| UINT16 Low Bit | X8B | X8A | X7B | X7A | X6B | X6A | X5B | X5A |

Table 5.3

### Mapping for BMM1 + BOM2

| Status/control | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Bit | X8B | X8A | X7B | X7A | X6B | X6A | X5B | X5A |
| UINT16 Low Bit | X4B | X4A | X3B | X3A | X2B | X2A | X1B | X1A |

Table 5.4

- **BMM2: retrofit mapping**
  In "pin-based" bit mapping mode 2 (BMM2), all ascending channel A bits (C/Q, channel A/pin 4) and all ascending channel B bits (channel B/pin 2) are transferred one after the other.

### Mapping for BMM2 + BOM1

| Status/control | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Bit | X8A | X7A | X6A | X5A | X4A | X3A | X2A | X1A |
| UINT16 Low Bit | X8B | X7B | X6B | X5B | X4B | X3B | X2B | X1B |

Table 5.5

### Mapping for BMM2 + BOM2

| Status/control | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Bit | X8B | X7B | X6B | X5B | X4B | X3B | X2B | X1B |
| UINT16 Low Bit | X8A | X7A | X6A | X5A | X4A | X3A | X2A | X1A |

Table 5.6

## Digital-IO Byte Order Mode (BOM)

Select the byte order of the status/control bytes using the "Digital-IO Byte Order Mode" parameter.

- **BOM1: retrofit, standard mapping**
  For BMM1, the ports X4 bit ... X1 bit are mapped to the status/control high byte.
  For BMM2, the A channel bits of the ports X8 bits ... X1 bits are mapped to the status/control high byte.

### Mapping for BOM1 + BMM1

| Status/control | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Bit | X4B | X4A | X3B | X3A | X2B | X2A | X1B | X1A |
| UINT16 Low Bit | X8B | X8A | X7B | X7A | X6B | X6A | X5B | X5A |

Table 5.7

### Mapping for BOM1 + BMM2

| Status/control | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Bit | X8A | X7A | X6A | X5A | X4A | X3A | X2A | X1A |
| UINT16 Low Bit | X8B | X7B | X6B | X5B | X4B | X3B | X2B | X1B |

Table 5.8

- **BOM2: new standard**
  For BMM1, the ports X8 bit ... X5 bit are mapped to the status/control high byte.
  For BMM2, the B channel bits of the ports X8 bits ... X1 bits are mapped to the status/control high byte.

2022-02

### Mapping for BOM2 + BMM1

| Status/control | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Bit | X8B | X8A | X7B | X7A | X6B | X6A | X5B | X5A |
| UINT16 Low Bit | X4B | X4A | X3B | X3A | X2B | X2A | X1B | X1A |

Table 5.9

### Mapping for BOM2 + BMM2

| Status/control | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Bit | X8B | X7B | X6B | X5B | X4B | X3B | X2B | X1B |
| UINT16 Low Bit | X8A | X7A | X6A | X5A | X4A | X3A | X2A | X1A |

Table 5.10

## Web Interface

Allow/disallow the use of the web server using the "Web Interface" parameter. If the parameter is set to "Disabled," the web pages are not accessible.

Default: Enabled

## Digital-Out Ch. B Restart Mode

- **Automatic Restart after Failure**
  If the parameter is set to "Automatic Restart after Failure," you can configure the restart behavior of the channel B outputs of ports 5 ... 8 (60 mm versions only).
  If an output short circuit or overload is detected, the output is switched off by the IO-Link master. However, to check whether the overload or short-circuit state is active, the output is automatically switched on again after a time delay.
- **Restart after Output Reset**
  If an output short circuit or overload is detected, the output is switched off by the IO-Link master. The output is not automatically reset. Before the output can be switched on again, it must be logically reset by the PLC.

Default: Automatic Restart after Failure

## Digital-Out Ch. A Controlled by

- **Port Submodule**
  Use the output byte 1/bit 0 of the corresponding subslot module to control the digital A channels.
- **Status/Control Module**
  If the parameter is set to "Status/Control Module," you can control the digital A channel outputs using the output bits of the status/control module. The digital outputs can be controlled only from one source of data.

Default: Port Submodule

### 5.2.6.2 General Diagnostic Settings

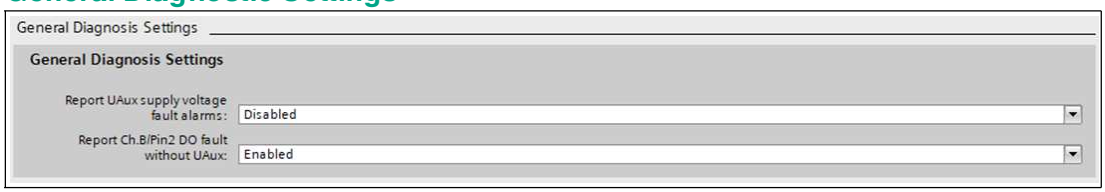



Figure 5.17

### Report UAux Supply Voltage Fault Alarms

Enable or disable the fault alarm of the $U_{Aux}$ supply voltage using the "Report $U_{Aux}$ supply voltage fault alarms" parameter.

Default: disabled

**Note**

To prevent diagnostic messages when the supply voltage is next switched on or off, the "Report UAux supply voltage fault" option is disabled by default.

### Report Ch.B/Pin2 DO Fault without UAux

The diagnosis of the digital outputs of channel B/pin 2 can be configured depending on the $U_{Aux}$ status.

Default: Enabled

## 5.2.6.3 Fail-Safe Configuration

The device supports a fail-safe function for channels that are used as digital outputs. During configuration of the devices, the status of the outputs after an interruption or loss of communication in the PROFINET IO network can be defined.

The following options can be selected:

- Set Low - the output channel is disabled and/or the output bit is set to 0.
- Set High - the output channel is enabled and/or the output bit is set to 1.
- Hold Last - the last output status is retained.

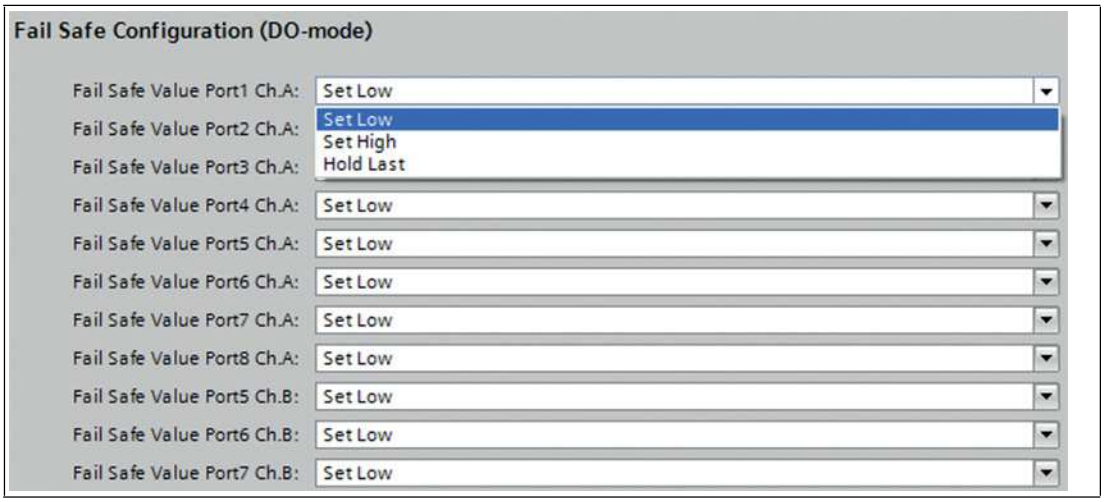



Figure 5.18

## 5.2.6.4 Surveillance Timeout Configuration

You can also configure the separate auxiliary voltage $U_{Aux}$, which is available on type B IO-Link channels (channel B/pin 2) of ports 5 ... 8, as an additional digital output ("Digital-IO mode for Ch. B" area). This enables you to switch the power supply like a digital output.

The firmware of the module allows you to configure a delay time before output current monitoring is enabled for this particular application. The delay time is referred to as the "Surveillance timeout" and can be configured for each output channel. The delay time starts after the status of the output channel changes i.e., if it is enabled after a rising edge or disabled after a falling edge. Once this time has elapsed, the output is monitored and fault states are reported by the diagnostics.

The "Surveillance Timeout" parameter can be set from 0 ... 255 ms. The default value for this parameter is 80 ms.

If an output channel is in a static state i.e., if the channel is permanently switched on or switched off, the typical value is 5 ms.

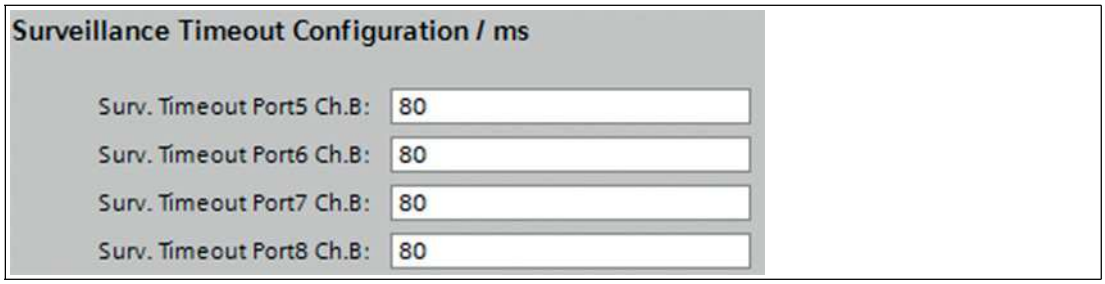



Figure 5.19

### 5.2.6.5 Digital Input Logic

This parameter can be used to configure the logic of channels that are used as digital inputs.

- **Default setting**:
  NO (normally open) for all channels
- **NO (normally open)**:
  In this case, an undamped sensor has an open switching output (low signal).
  The device input detects a low level and returns a 0 to the control unit.
- **NC (normally closed)**:
  In this case, an undamped sensor has a closed switching output (high signal).
  The device input detects a high level, inverts the signal, and returns a 0 to the control unit.

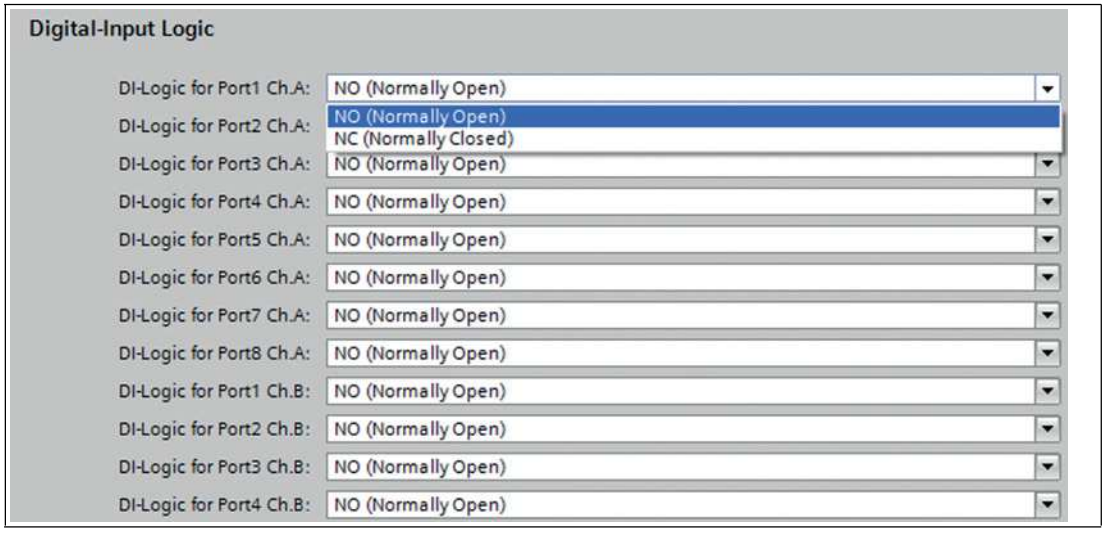



Figure 5.20

### 5.2.6.6 Digital-IO-mode for Ch. B/Pin 2

In this area, you can parameterize the IO-Link connections of ports 5 ... 8, class B, as follows:

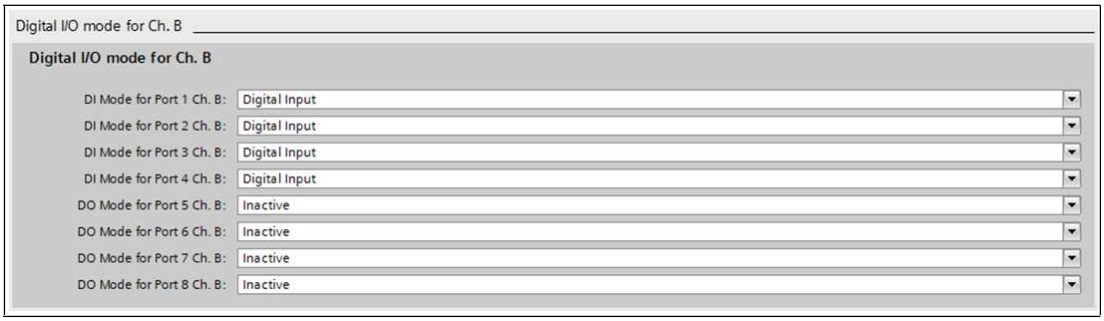



Figure 5.21

- **Default setting**:
  Port 1 ... 4: digital input
  Port 5 ... 8: inactive
- **Auxiliary Power (IO-Link Type B)**:
  In this mode, pin 2 and pin 5 of the IO-Link connections of class B ports 5 ... 8 serve as an auxiliary voltage output.
  The auxiliary voltage is provided via the $U_{AUX}$ supply input.
  The auxiliary voltage output cannot be controlled.
- **Digital Output (DO)**:
  In this mode, pin 2 of the IO-Link connections of class B ports 5 ... 8 can be used as a digital output.
  The control bits are transferred to the device by the control unit within the status/control module.
  A "Surveillance Timeout" can be parameterized for the outputs ("Surveillance Timeout Configuration" area).

## 5.2.7 Siemens IO-Link Library

### IO-Link Device Parameterization

**SIEMENS IO-Link Library**

With the Siemens TIA Portal "IO_LINK_DEVICE" functional module, device parameters can be written to an IO-Link device and parameters, measured values, and diagnostic data can be read acyclically. For STEP7 Classic V5.5, the original version "IO_LINK_CALL" is to be used for acyclic communication with IO-Link devices.

In a revised version of this library, "IO_LINK_CALL" was replaced by the "IO_LINK_DEVICE" functional module for acyclic communication with IO-Link devices.

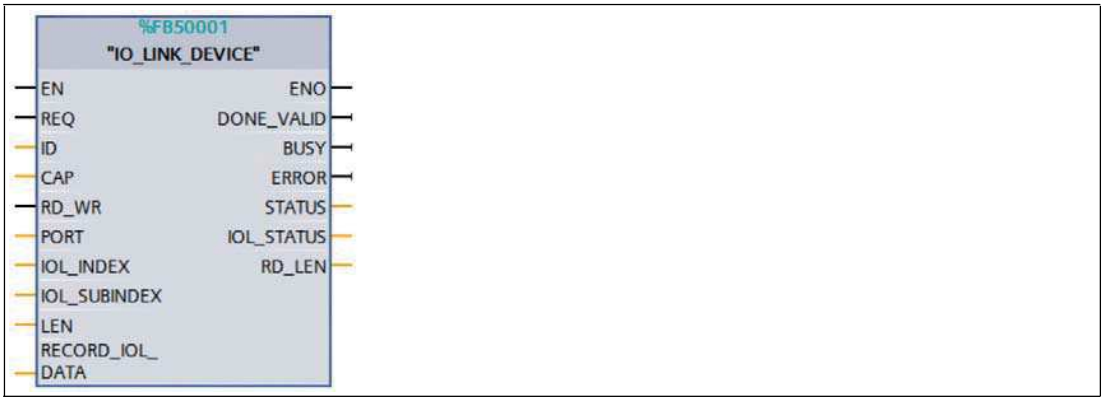



Figure 5.22 TIA Portal IO_LINK_DEVICE

2022-02


Figure 5.23 STEP 7 V5.5 IO_LINK_CALL

The service data is clearly addressed via the index and sub-index. Using the hardware identifier of the status/control module (ID), you can read and write the Client Access Point (CAP = 255) and the corresponding IO-Link port (PORT: 1 - 8 for IO-Link ports).

**Note**

If the logical input address for the IO_LINK_CALL module is used, it may be necessary for the input address to be less than or equal to the output address.

You may need to change this value manually in the engineering tool.

## 5.2.8 Replacing Devices Without a Removable Medium/Programming Unit

**Note**

The replacement device that will be used for a replacement without a removable medium/programming unit must still have its factory settings applied. If necessary, the factory settings must be restored.

PROFINET IO devices that support the "Device replacement without removable medium or programming unit" function can be replaced by identical devices in an existing PROFINET network. In such cases, the IO controller assigns the device name. To do so, it uses the configured topology and the neighborhoods determined by the IO devices. The Ethernet IO modules support the device replacement function without a removable medium/programming unit.

1. Click on the PLC in slot 1 (1).
2. In the "Profinet interface_1 [Module]" area, click on "Advanced options" (2).
3. Change to the "Properties" tab (3) and click on the option to replace a device without a removable medium (4).

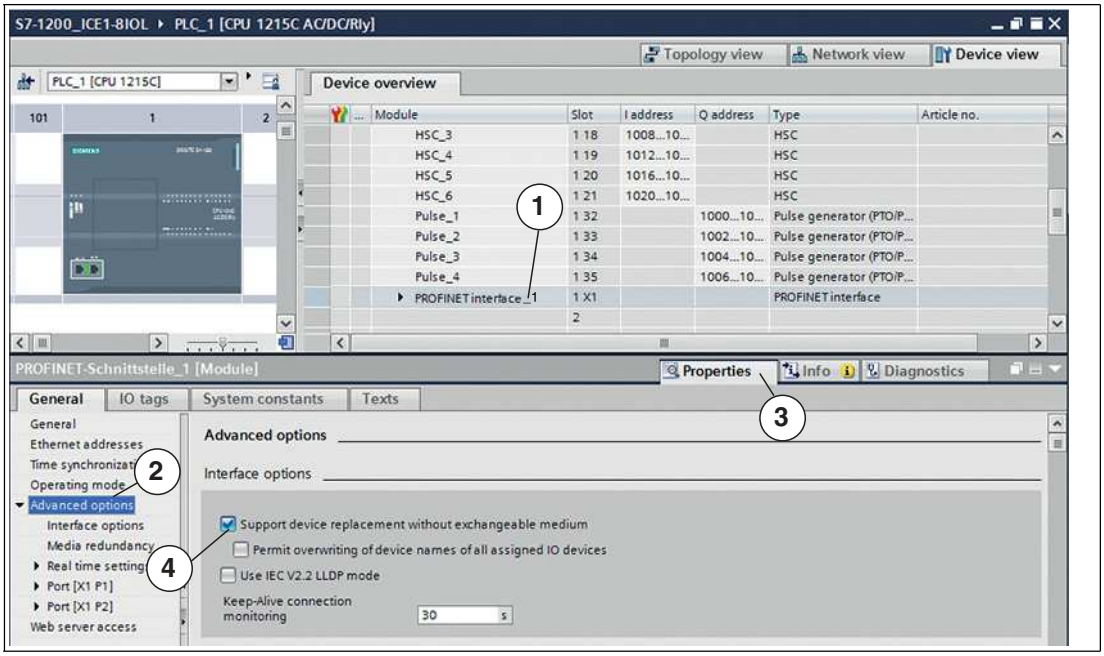



Figure 5.24

**Note**

A network topology is configured based on the connections between PROFINET ports on the individual devices. This can be reached via slot 0 of the PROFINET devices in use. Displaying all non-linked ports allows you to specify a suitable partner port in each case.

4. Define the network topology for the device replacement. To do so, select "Devices & networks" and "Topology view."
5. Use the mouse to drag a connection between the module and the PLC.

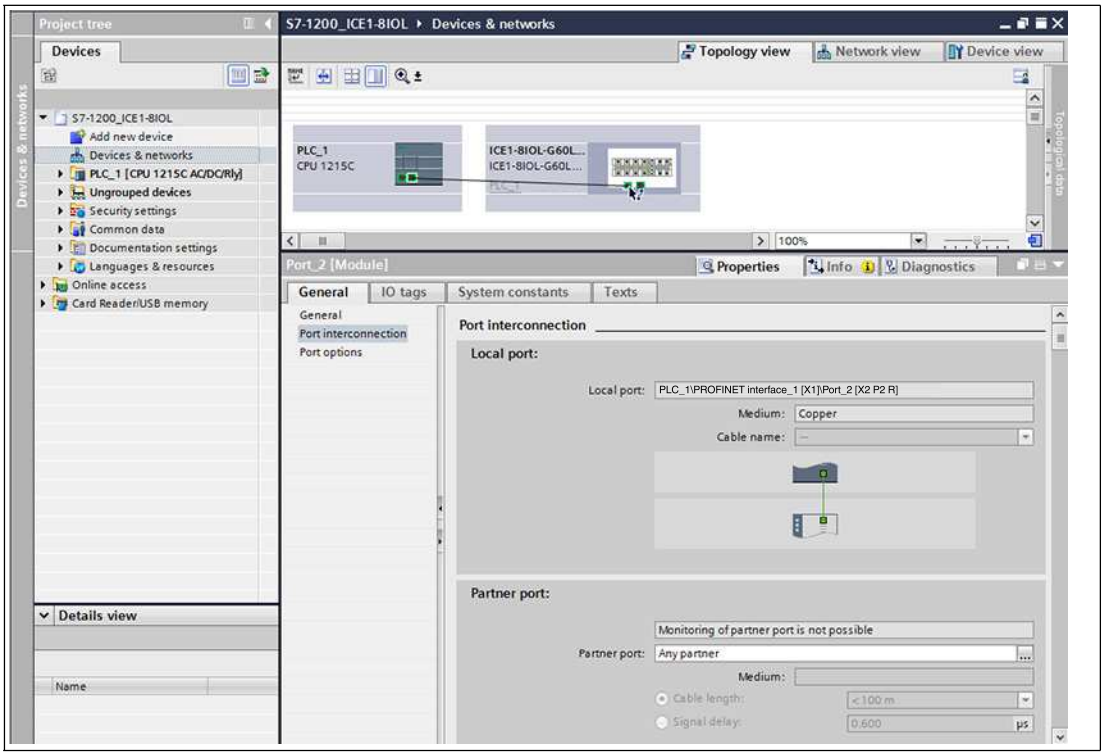



Figure 5.25

2022-02



PEPPERL+FUCHS

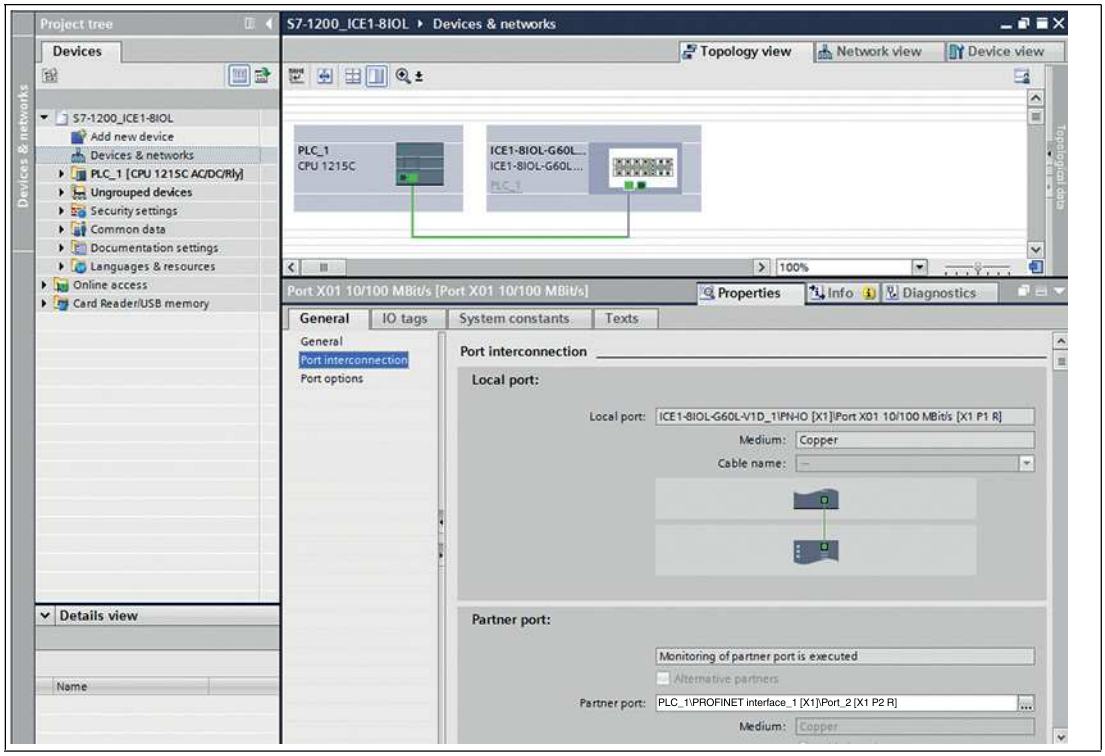



Figure 5.26

↳ The port interconnection was successful if the link is shown in the "Topology View" and on the "Partner Port."

## 5.2.9 Identification and Maintenance Functions (I&M)

The PROFINET module is capable of uniquely identifying devices installed in the system by means of an electronic nameplate. This device-specific data can be read acyclically at any time by the user. In addition, the installation date, location code, and other descriptions can be defined in the module on creation of the system.

### Supported I&M Functions

- Module-specific I&M functions
  The module-specific I&M features 0 to 4 can be read or written via slot 0. The specified index is used for the mapping of data records.

**I&M 0**

| Data object | Length [byte] | Access | Default value/description |
|---|---|---|---|
| MANUFACTURER_ID | 2 | Read | 0x005D |
| ORDER_ID | 20 | Read | Order number of the module in ASCII |
| SERIAL_NUMBER | 16 | Read | Defined in the production process, in ASCII |
| HARDWARE_REVISION | 2 | Read | Hardware revision of the device |
| SOFTWARE_REVISION | 4 | Read | Software revision of the device |
| REVISION_COUNTER | 2 | Read | Counts each statically stored parameter change on the IO-Link master (e.g., device name or IP address) |
| PROFILE_ID | 2 | Read | 0xF600 (generic device) |
| PROFILE_SPECIFIC_TYPE | 2 | Read | 0x0003 (IO module) |

| Data object | Length [byte] | Access | Default value/description |
|---|---|---|---|
| IM_VERSION | 2 | Read | 0x0101 (I&M version 1.1) |
| IM_SUPPORTED | 2 | Read | 0x001E (I&M 1 ... 4 supported) |

Table 5.11 I&M 0 (slot 0, index 0xAFF0)

### I&M 1

| Data object | Length [byte] | Access | Default value/description |
|---|---|---|---|
| TAG_FUNCTION | 32 | Read/write | 0x20 et seq. (empty) |
| TAG_LOCATION | 22 | Read/write | 0x20 et seq. (empty) |

Table 5.12 I&M 1 (slot 0, index 0xAFF1)

### I&M 2

| Data object | Length [byte] | Access | Default value/description |
|---|---|---|---|
| INSTALLATION_DATE | 16 | Read/write | 0x20 et seq. (empty)<br>The supported data format is a visible character string with a fixed length of 16 bytes;<br>"YYYY-MM-DD hh:mm" or "YYYY-MM-DD" filled with spaces |

Table 5.13 I&M 2 (slot 0, index 0xAFF2)

### I&M 3

| Data object | Length [byte] | Access | Default value/description |
|---|---|---|---|
| DESCRIPTOR | 54 | Read/write | 0x20 et seq. (empty) |

Table 5.14 I&M 3 (slot 0, index 0xAFF3)

### I&M 4

| Data object | Length [byte] | Access | Default value/description |
|---|---|---|---|
| SIGNATURE | 54 | Read/write | 0x20 et seq. (empty) |

Table 5.15 I&M 4 (slot 0, index 0xAFF4)

## I&M Functions of the IO-Link Master

The IO-Link master-specific I&M functions 0 and 99 can be read via slot 1. The specified index is used for the mapping of data records.

### I&M 0

| Data object | Length [byte] | Access | Default value/description |
|---|---|---|---|
| MANUFACTURER_ID | 2 | Read | 0x005D |
| ORDER_ID | 20 | Read | Order number of the module in ASCII |
| SERIAL_NUMBER | 16 | Read | Defined in the production process, in ASCII |
| HARDWARE_REVISION | 2 | Read | Hardware revision of the device |
| SOFTWARE_REVISION | 4 | Read | Software revision of the device |
| REVISION_COUNTER | 2 | Read | Counts each statically stored parameter change on the IO-Link master (e.g., device name or IP address) |
| PROFILE_ID | 2 | Read | 0xF600 (generic device) |
| PROFILE_SPECIFIC_TYPE | 2 | Read | 0x0003 (IO module) |
| IM_VERSION | 2 | Read | 0x0101 (I&M version 1.1) |
| IM_SUPPORTED | 2 | Read | 0x001E (I&M 1 ... 4 supported) |

Table 5.16 I&M 0 (slot 0, index 0xAFF0)

### I&M 99

| Data object | Length [byte] | Access | Default value/description |
|---|---|---|---|
| IOL_VERSION | 1 | Read | 0x11 (IO-Link version 1.1) |
| IOL_PROFILE_VERSION | 1 | Read | 0x10 (IO-Link profile version 1.0) |
| IOL_FEATURE_SUPPORT | 4 | Read | 0x00000000 |
| NUMBER_OF_PORTS | 1 | Read | 0x08 (number of supported IO-Link connections) |
| REF_PORT_CONFIG | 1 | Read | 0x00 (no connection configuration data supported) |
| REF_IO_MAPPING | 1 | Read | 0x00 (no I/O mapping data supported) |
| REF_IPAR_DIRECTORY | 1 | Read | 0x00 (no IPar directory supported) |
| REF_IOL_M | 1 | Read | 0x00 (no IOL-M parameters supported) |
| NUMBER_OF_CAPS | 1 | Read | 0x01 (number of client access points) |
| INDEX_CAP1 | 1 | Read | 0xFF (client access point for IOL_CALL) |

Table 5.17 I&M 99 (slot 1, index 0xB063)

## I&M Functions of the IO-Link Device

The IO-Link device-specific I&M functions 16 and 23 can be read via slot 1, sub-slot 1. The specified index is used for the mapping of data records.

Only data that is not equal to zero is received when a connection to an IO-Link device can be established.

**I&M 16 ... 23**

| Data object | Length [byte] | Access | Default value/description |
|---|---|---|---|
| VENDOR_ID | 2 | Read | 0x0000 (IO-Link device vendor ID) |
| DEVICE_ID | 4 | Read | 0x00000000 (IO-Link device ID) |
| FUNCTION_ID | 2 | Read | 0x0000 (IO-Link device function ID) |
| RESERVED | 10 | Read | 0x00 et seq. |

Table 5.18 I&M 16 ... 23 (slot 1, sub-slot 1, index 0xB000...0xB007)

## Reading and Writing I&M Data

In its standard library, SIEMENS offers system functions with which I&M data can be read and written. A data record contains a 6 byte block header and the current I&M data record. The data requested when reading or the data to be written only begins after the existing block header. When writing, the block header must also be taken into account.

The following table shows the structure of a data record.

| Data object | Length [byte] | Data Type | Coding | Description |
|---|---|---|---|---|
| BlockType | 2 | Word | I&M 0: 0x0020<br>I&M 1: 0x0021<br>I&M 2: 0x0022<br>I&M 3: 0x0023<br>I&M 4: 0x0024<br>I&M 16...23: 0x0F00<br>I&M 99: 0x0F00 | BlockHeader |
| BlockLength | 2 | Word | I&M 0: 0x0038<br>I&M 1: 0x0038<br>I&M 2: 0x0012<br>I&M 3: 0x0038<br>I&M 4: 0x0038<br>I&M 16...23: 0x0014<br>I&M 99: 0x000F | |
| BlockVersionHigh | 1 | Byte | 0x01 | |
| BlockVersionLow | 1 | Byte | 0x00 | |
| I&M data | I&M 0: 54<br>I&M 1: 54<br>I&M 2: 16<br>I&M 3: 54<br>I&M 4: 54<br>I&M 16...23: 18<br>I&M 99: 13 | Byte | | I&M record |

Table 5.19 Data record with BlockHeader and I&M record

### Reading I&M Records

I&M data can be read using the standard RDREC (SFB52) command block in the TIA portal. First, the hardware identifier of the CPU is read out under "PLC Variables > System Constants." The CPU should be displayed there as <Local> with the data type "Hw_SubModule." You specify the hardware identifier via the corresponding input parameter (ID). The I&M index (INDEX) must also be transmitted. The return parameters indicate the length of the received I&M data and contain a corresponding status or error message.

### Writing I&M Records

I&M data can be written using the standard WDREC (SFB53) function block in the TIA portal. First, the hardware identifier of the CPU is read out under "PLC Variables > System Constants." The CPU should be displayed there as <Local> with the data type "Hw_SubModule." You specify the hardware identifier via the corresponding input parameter (ID). The I&M index (INDEX) and the data length (LEN) to be written must also be transmitted. The return parameters contain a status or an error message.

## 5.2.10 Prioritized Start-Up/Fast Start-Up (FSU)

The modules with Fast Start-Up (FSU) support optimized system power-up. This ensures a quick restart after a power supply is restored after an interruption.

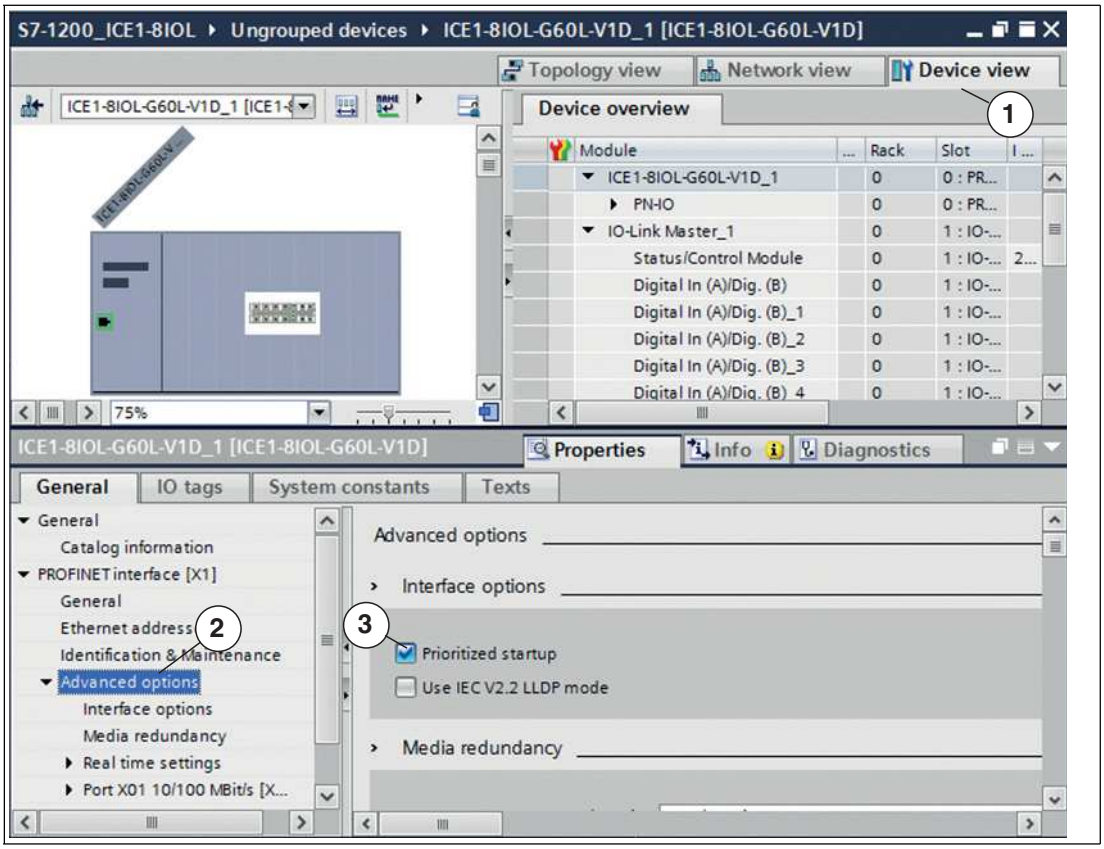



Figure 5.27

1. Select "Device View" (1) and the desired module (in this example, slot 1 for ICE1-8IOL-G60L-V1D_1).
2. Then, in the "General" tab, select the "Advanced Options" area (2).
3. Click on the "Prioritized Start-Up" option (3) to enable prioritized startup.

## 5.3 Bit Assignment

The IO-Link master uses a modular device model. Slot 1/subslot 1 contains the status/control module. This module provides 2 bytes of input data and 2 bytes of output data for IO-Link masters with S2 system redundancy. When an IO-Link master is selected from the GSD file, the module is integrated automatically and cannot be changed. The IO-Link ports use the following subslots 2 ... 9 in slot 1. Depending on the configuration, they may have a different operating mode and data length.

### 5.3.1 Process Data Status / Control Module, Slot 1 / Subslot 1

The status/control module has an UINT16 for digital input data and an UINT16 for digital output data.

#### Status Data (Input)

The input UINT16 contains the status of the digital inputs. For the digital A channel inputs, the data is available in the input byte of the corresponding sub-slot module.

#### Control Data (Output)

The output UINT16 contains the control bits for the digital B channel outputs. The byte 1 / bit 0 output for the corresponding sub-slot module must be used to control the digital A channels. The General Device Settings parameter Digital Out Ch. A Controlled By: Status/Control Module can be used to switch to control bits. In this instance, the outputs cannot be controlled via the byte 1 / bit 0 sub-slot output.

The digital output can be controlled only from one source of data.

#### Parameter Dependencies of the Digital I/O Data Mapping

Select the settings for Bit Mapping Mode (BMM) and Byte Order Mode (BOM) for the digital I/O mapping of status/control module data. See chapter 5.2.6.1

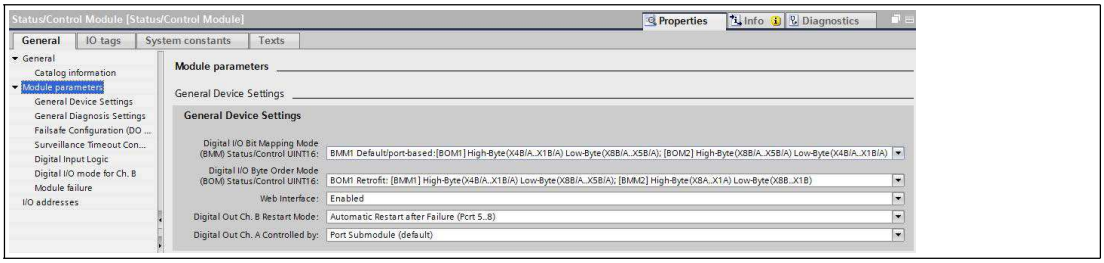



Figure 5.28

#### 5.3.1.1 Digital I/O Mapping Mode 1 (Default Mapping)

If mapping mode 1 has been selected in the device configuration, the data of the status/control module is transferred as follows.

**"Digital Input" Status with BMM1 and BOM1**

| Input | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Byte | DI X4B | DI X4A | DI X3B | DI X3A | DI X2B | DI X2A | DI X1B | DI X1A |
| UINT16 Low Byte | **DO X8B** | DI X8A | **DO X7B** | DI X7A | **DO X6B** | DI X6A | **DO X5B** | DI X5A |

Table 5.20 **Bold:** "Auxiliary Power" or "Digital Output" mode

In the "Digital Output" and "Auxiliary Power" modes, the digital output statuses are reflected as the status in the digital inputs.

- DI 1A = digital input connection 1, channel A (pin 4)
- DO 7B = output status connection 7B

2022-02

#### "Digital Input" Status with BMM1 and BOM2

| Input | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Byte | **DO X8B** | DI X8A | **DO X7B** | DI X7A | **DO X6B** | DI X6A | **DO X5B** | DI X5A |
| UINT16 Low Byte | DI X4B | DI X4A | DI X3B | DI X3A | DI X2B | DI X2A | DI X1B | DI X1A |

Table 5.21 **Bold:** "Auxiliary Power" or "Digital Output" mode

In the "Digital Output" and "Auxiliary Power" modes, the digital output statuses are reflected as the status in the digital inputs.

- DI 1A = digital input connection 1, channel A (pin 4)
- DO 7B = output status connection 7B

#### "Digital Output" Check with BMM1 and BOM1

| Output | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Byte | n/a | DO X4A optional | n/a | DO X3A optional | n/a | DO X2A optional | n/a | DO X1A optional |
| UINT16 Low Byte | DO X8B | DO X8A optional | DO X7B | DO X7A optional | DO X6B | DO X6A optional | DO X5B | DO X5A optional |

Table 5.22

- n/a = not available
- DO 5B = digital output connection 1, channel B (pin 2)
- DO 1A optional = Optional if configured as DO and the **General device** parameter **Digital Out Channel A Controlled by** is set to `Status/Control Module`. (Otherwise, the control data is displayed in bit 0 of the corresponding subslot byte.)

#### "Digital Output" Check with BMM1 and BOM2

| Output | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Byte | DO X8B | DO X8A optional | DO X7B | DO X7A optional | DO X6B | DO X6A optional | DO X5B | DO X5A optional |
| UINT16 Low Byte | n/a | DO X4A optional | n/a | DO X3A optional | n/a | DO X2A optional | n/a | DO X1A optional |

Table 5.23

- n/a = not available
- DO 5B = digital output connection 1, channel B (pin 2)
- DO 1A optional = Optional if configured as DO and the **General device** parameter **Digital Out Channel A Controlled by** is set to `Status/Control Module`. (Otherwise, the control data is displayed in bit 0 of the corresponding subslot byte.)

### 5.3.1.2 Digital I/O Mapping Mode 2 (Alternative Mapping)

If mapping mode 2 has been selected in the device configuration, the data of the status/control module is transferred as follows.

#### "Digital Input" Status with BMM2 and BOM1

| Input | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Byte | DI X8A | DI X7A | DI X6A | DI X5A | DI X4A | DI X3A | DI X2A | DI X1A |
| UINT16 Low Byte | DO X8B | DO X7B | DO X6B | DO X5B | DI X4B | DI X3B | DI X2B | DI X1B |

Table 5.24

- The status of the digital outputs is returned in the digital input data.
- DI 1A = digital input connection 1, channel A (pin 4)

- DO 7B = output status connection 7B

### "Digital Input" Status with BMM2 and BOM2

| Input | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Byte | DO X8B | DO X7B | DO X6B | DO X5B | DI X4B | DI X3B | DI X2B | DI X1B |
| UINT16 Low Byte | DI X8A | DI X7A | DI X6A | DI X5A | DI X4A | DI X3A | DI X2A | DI X1A |

Table 5.25

- The status of the digital outputs is returned in the digital input data.
- DI 1A = digital input connection 1, channel A (pin 4)
- DO 7B = output status connection 7B

### "Digital Output" Check with BMM2 and BOM1

| Output | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Byte | DO X8A optional | DO X7A optional | DO X6A optional | DO X5A optional | DO X4A optional | DO X3A optional | DO X2A optional | DO X1A optional |
| UINT16 Low Byte | DO X8B | DO X7B | DO X6B | DO X5B | n/a | n/a | n/a | n/a |

Table 5.26

- DO 5B = digital output connection 1, channel B (pin 2)
- DO 1A optional = Optional if configured as DO and the **General device** parameter **Digital Out Channel A Controlled by** is set to `Status/Control Module`.

### Mapping the I/O Channel to the PROFINET Channel Diagnostics

| Connection | X8 | X7 | X6 | X5 | X4 | X3 | X2 | X1 |
|---|---|---|---|---|---|---|---|---|
| Pin | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 |
| Channel | B/A | B/A | B/A | B/A | B/A | B/A | B/A | B/A |
| PROFINET channel diagnostics | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

Table 5.27

### "Digital Output" Check with BMM2 and BOM2

| Output | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|
| UINT16 High Byte | DO X8B | DO X7B | DO X6B | DO X5B | n/a | n/a | n/a | n/a |
| UINT16 Low Byte | DO X8A optional | DO X7A optional | DO X6A optional | DO X5A optional | DO X4A optional | DO X3A optional | DO X2A optional | DO X1A optional |

Table 5.28

- DO 5B = digital output connection 1, channel B (pin 2)
- DO 1A optional = Optional if configured as DO and the **General device** parameter **Digital Out Channel A Controlled by** is set to `Status/Control Module`.

**Mapping the I/O Channel to the PROFINET Channel Diagnostics**

| Connection | X8 | X7 | X6 | X5 | X4 | X3 | X2 | X1 |
|---|---|---|---|---|---|---|---|---|
| Pin | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 | 2/4 |
| Channel | B/A | B/A | B/A | B/A | B/A | B/A | B/A | B/A |
| PROFINET channel diagnostics | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

Table 5.29

## 5.3.2 IO-Link Connections Process Data, Slot 1/Subslot 2 ... Subslot 9

The process data lengths of the IO-Link connections in COM mode depend on the configurations of IO-Link connections X1 ... X8. Data lengths between 1 ... 33 bytes of input data and/or 1 ... 32 bytes of output data can be configured.

The data content can be taken from the descriptions of the IO-Link devices.

If no precise data length exists for the IO-Link device configuration, always select the next largest data length.

The last byte of the port input data contains the PQI byte (Port Qualifier Information). This byte is added to the input data for the IOL device by the IOL master.

### Ch. A Configuration as Digital Input

**Note**

If the port is configured as a digital input, the port data length is one byte and the status of the digital input is set to bit 0.

The mapping mode selected for the status/control module has no influence on the process data of the IO-Link connections.

**Input Data: Sub-Slots 1.2 ... 1.9**

| INPUT | Input | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|---|
| Slot 1.2 | X1 Byte 1 ... 33 | • If the IO-Link port is in "Digital-In" mode, the status is set to "DI-C/Q" (channel A, pin 4) in bit 0 / byte 1. In this case, no PQI byte is available.<br>• The last byte contains the PQI (Port Qualifier Information). | | | | | | | |
| Slot 1.3 | X2 Byte 1 ... 33 | | | | | | | | |
| Slot 1.4 | X3 Byte 1 ... 33 | | | | | | | | |
| Slot 1.5 | X4 Byte 1 ... 33 | | | | | | | | |
| Slot 1.6 | X5 Byte 1 ... 33 | | | | | | | | |
| Slot 1.7 | X6 Byte 1 ... 33 | | | | | | | | |
| Slot 1.8 | X7 Byte 1 ... 33 | | | | | | | | |
| Slot 1.9 | X8 Byte 1 ... 33 | | | | | | | | |

Table 5.30

**PQI Description**

| Bit | Acronym | Short Description | Value | Description |
|---|---|---|---|---|
| 0 | - | Reserved | 0 | Reserved |
| | | | - | - |
| 1 | - | Reserved | 0 | Reserved |
| | | | - | - |

| Bit | Acronym | Short Description | Value | Description |
|---|---|---|---|---|
| 2 | New-Param | New parameter | 0 | no update of IOL device parameter detected |
| | | | 1 | update of IOL device parameter detected: master performed a parameter storage upload (Master to Device) and a new IOL-D Backup object (0xB904) is available |
| 3 | SubstDev | Substitute device detection | 0 | *Not supported, do not evaluate this bit!* |
| | | | 1 | *Not supported, do not evaluate this bit!* |
| 4 | PortActive | Port activation | 0 | port deactivated via port function |
| | | | 1 | port activated (default) |
| 5 | DevCom | Device communication | 0 | no IOL device available |
| | | | 1 | IOL device detected and is in PREOPERATE or OPERATE state |
| 6 | DevErr | Port/device error indication | 0 | no error / warning occurred |
| | | | 1 | error/warning assigned to IOL device or IOL master port occurred |
| 7 | PQ | Device process data validity | 0 | invalid I/O process data from IOL device |
| | | | 1 | valid I/O process data from device |

Table 5.31

### Output Data: Sub-Slots 1.2 ... 1.9

| INPUT | Input | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|---|---|---|---|---|---|---|---|---|---|
| Slot 1.2 | X1 Byte 1 ... 32 | • Optional / if the IO-Link port is in "Digital-Out" mode, the state is set to "DO-C/Q" (channel A, pin 4) in bit 0 / byte 1. | | | | | | | |
| Slot 1.3 | X2 Byte 1 ... 32 | | | | | | | | |
| Slot 1.4 | X3 Byte 1 ... 32 | | | | | | | | |
| Slot 1.5 | X4 Byte 1 ... 32 | | | | | | | | |
| Slot 1.6 | X5 Byte 1 ... 32 | | | | | | | | |
| Slot 1.7 | X6 Byte 1 ... 32 | | | | | | | | |
| Slot 1.8 | X7 Byte 1 ... 32 | | | | | | | | |
| Slot 1.9 | X8 Byte 1 ... 32 | | | | | | | | |

Table 5.32

## Ch. A Configuration as Digital Output

**Note**

If the port is configured as a digital output, the port data length is one byte (one byte for digital output control bit 0). If the General Device parameter Digital Out Ch. A Controlled by is set to Status/Control Module, the output cannot be controlled by bit 0 in the port output byte.

# 6 The Integrated Web Server

The module has an integrated web server that provides functions for configuring modules, and displaying status and diagnostic information.

The web interface offers an overview of the module configuration and status. It can also be used to adjust specific settings, perform a restart, reset to factory settings, and update firmware.

## Status Page

Enter `http://` in the address bar of the web browser, followed by the IP address, e.g., `http://192.168.1.1`.

If the module home page does not open, please check your browser and firewall settings.

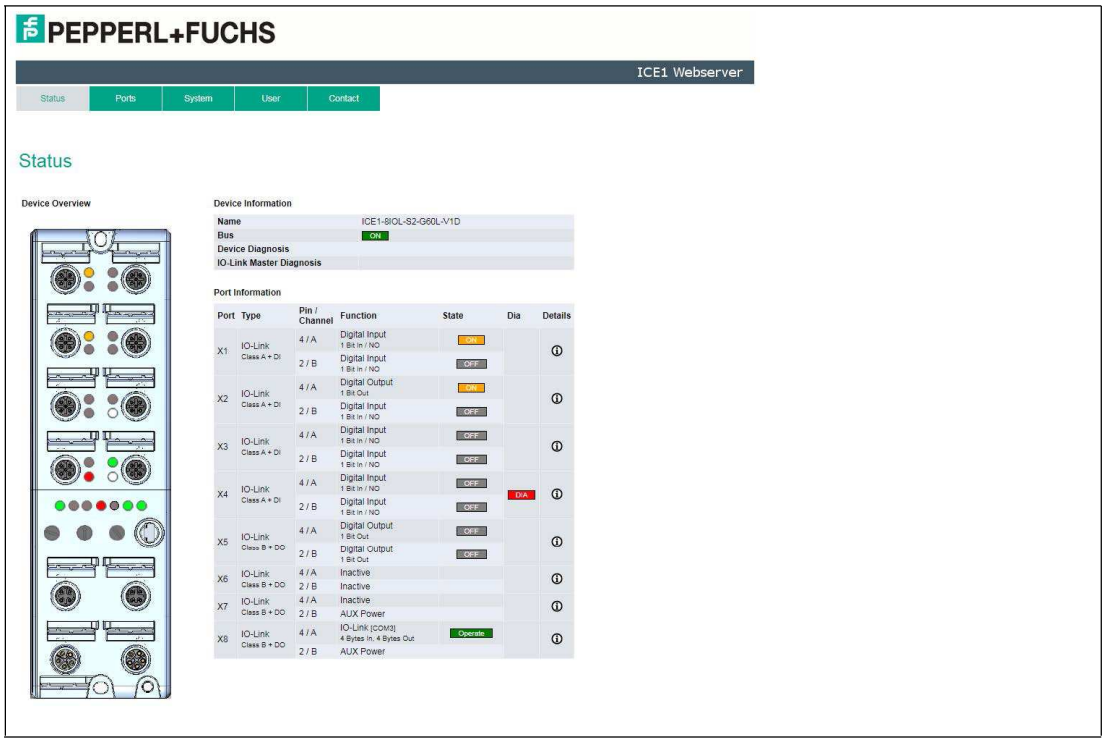



Figure 6.1

This page serves as a starting point for access to the integrated web server.

**Device Overview**

The left side shows a graphical representation of the module with all LEDs and the positions of the rotary coding switches

**Device Information**

The "Device Information" table contains some basic data on the module, e.g., the version, the state of the cyclic communication, and a diagnostic indicator. The diagnostic indicator shows whether a diagnosis is present in the module.

**Port Information**

The "Port Information" table indicates the configuration and status of all I/O ports of the module.

## Ports (Connection Side)

Click the "Ports" tab in the menu bar of the start window. A new window opens with the details of the individual ports:

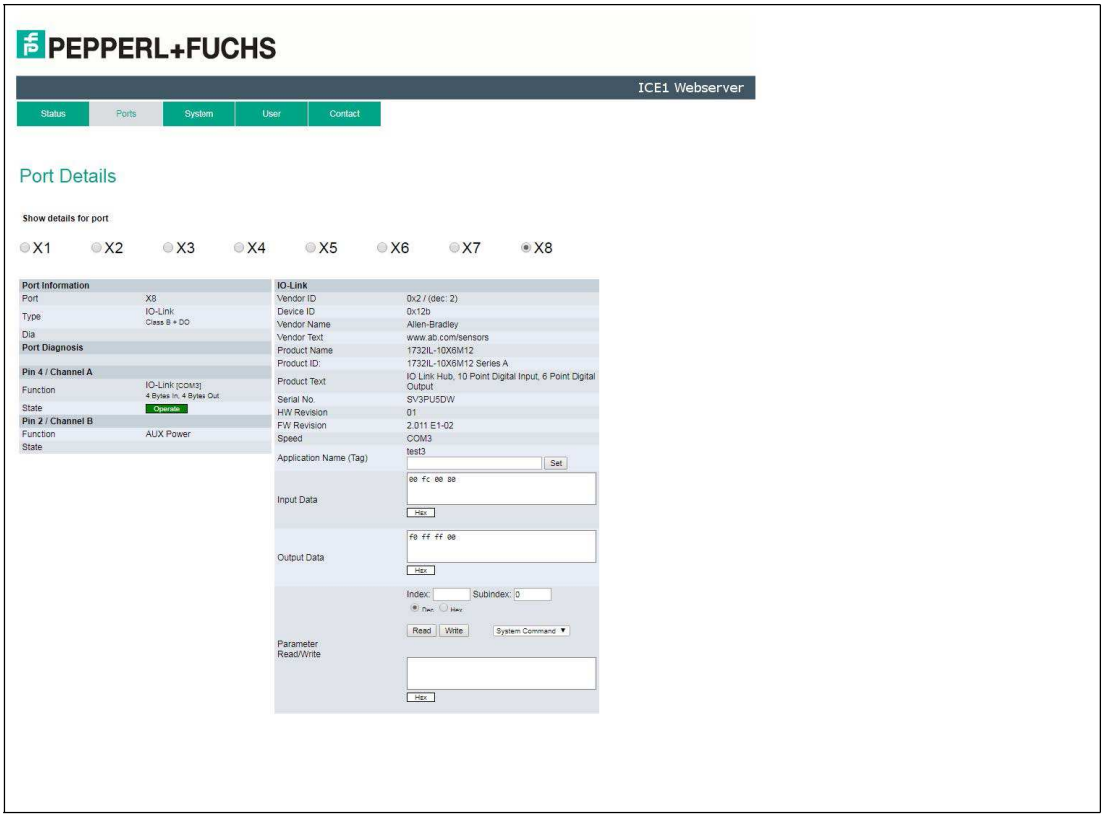



Figure 6.2

Detailed port information is displayed.

- Port Diagnosis shows incoming and outgoing diagnoses in plain text.
- Pin 2 and pin 4 contain information about the configuration and status of the port.
- Additional information about the connected sensor and its process data is shown under IO-Link.

## System Page

Click the "System" tab in the menu bar of the start window. A new window opens with information on the system of the module:

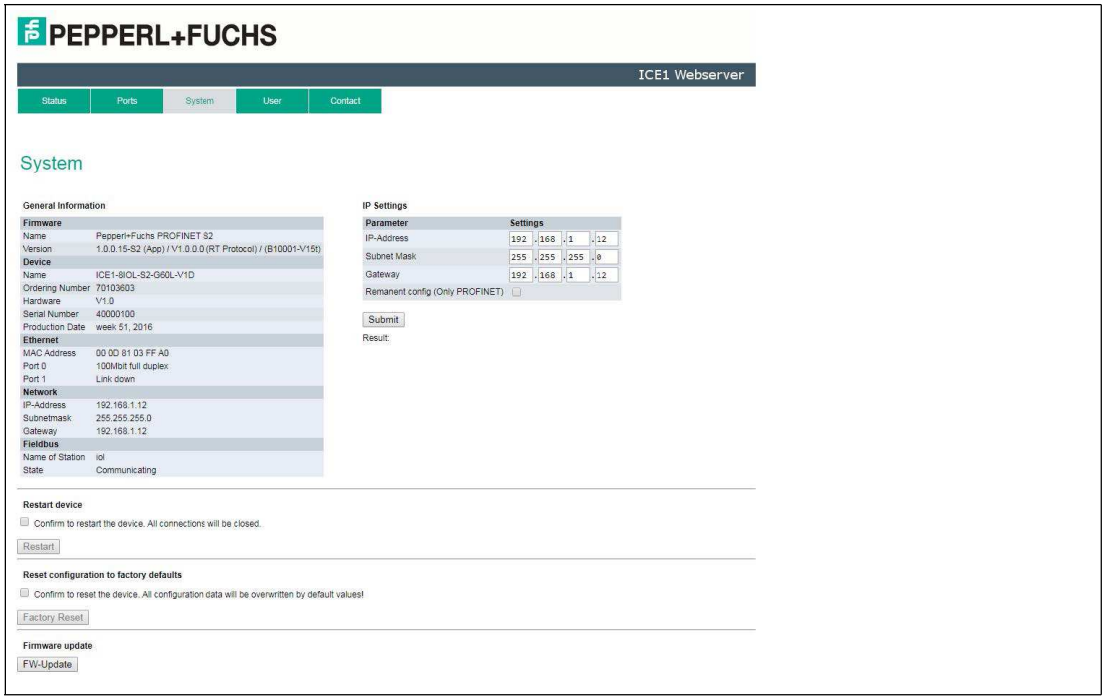



Figure 6.3

This page contains information about the following values and parameters:

- The firmware name and version is displayed under "Firmware".
- The "Device" section contains all the information about the module itself.
- Restart device
  - The module initializes a software reset.
- Reset configuration to factory defaults
  - The module restores the default factory settings.

**Note**

During a factory reset, the "BF/MS/RUN" LED will light up red three times. Once reset to the factory settings, the "BF/MS/RUN" LED will light up green three times. Once the LED has lit up green three times, restart the device and wait ten seconds.

- Firmware update
  The module initializes a firmware update.
  Select the provided *.ZIP container to update firmware. For firmware updates, please contact our support team. Follow the instructions that appear on the screen.

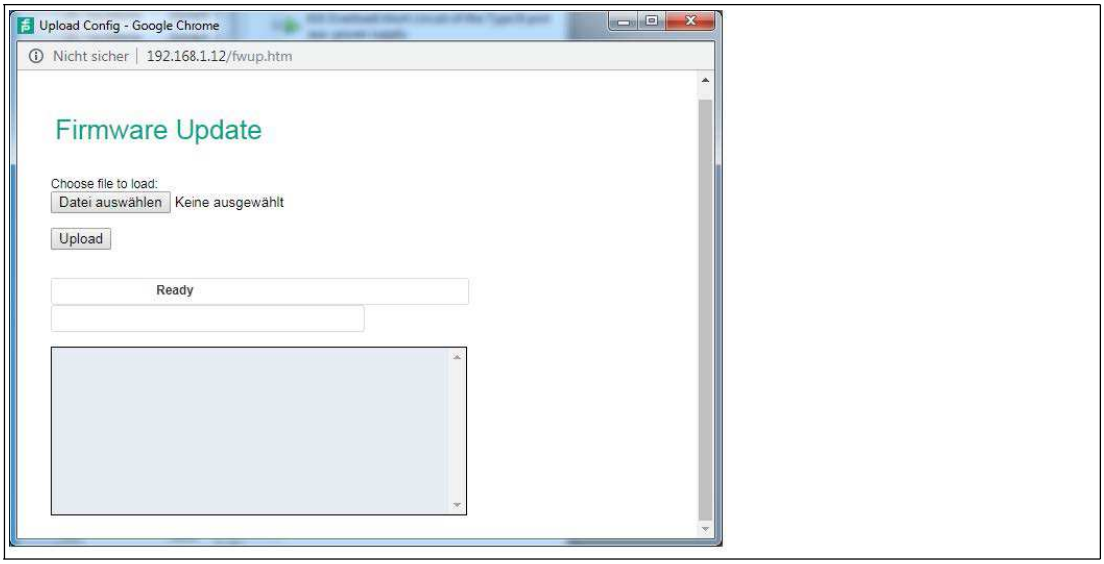



Figure 6.4

## User Administration

Click on the "User" tab in the menu bar of the start window. A new window opens with the user administration settings for the module:

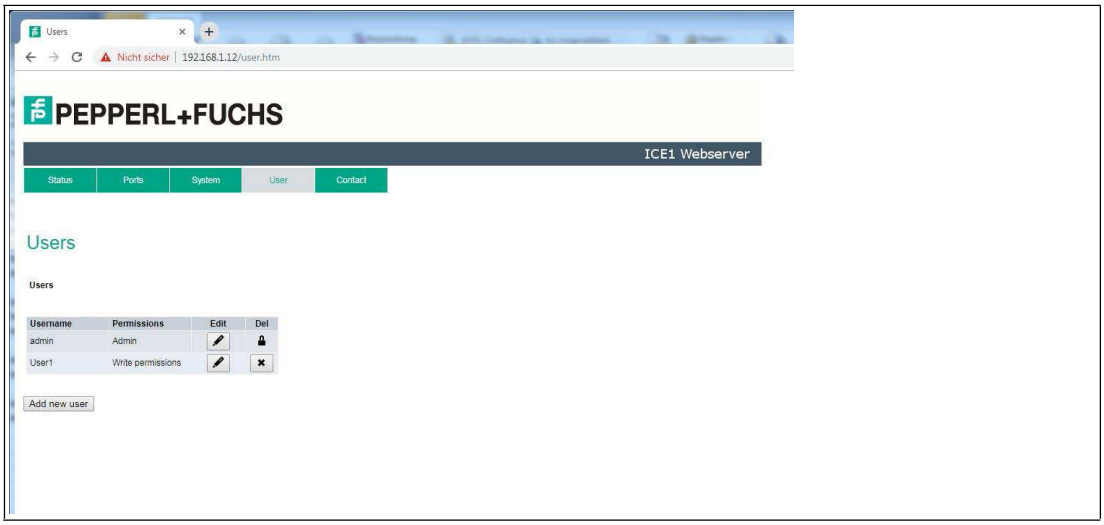



Figure 6.5

This page contains the settings relevant to managing the users of the module. New users can be added with **Admin** or **Write** access permissions.

**Tip**

For security reasons, change the default admin password once the device has been configured.

Default user login data:

- User: admin
- Password: private

2022-02

## Contact Page

Click on the "Contact" tab in the menu bar of the start window. A new window with the contact data of Pepperl+Fuchs opens:


Figure 6.6

The address of the contact page is:

http://[IP address]/contact.htm

This page provides information about Pepperl+Fuchs Group contact details.

# 7 Troubleshooting

## 7.1 Diagnostics Indicator in the Integrated Web Server

The module shows the error diagnostics on the connection page of the integrated web server. For information on how to call up the connection page, see chapter 6.

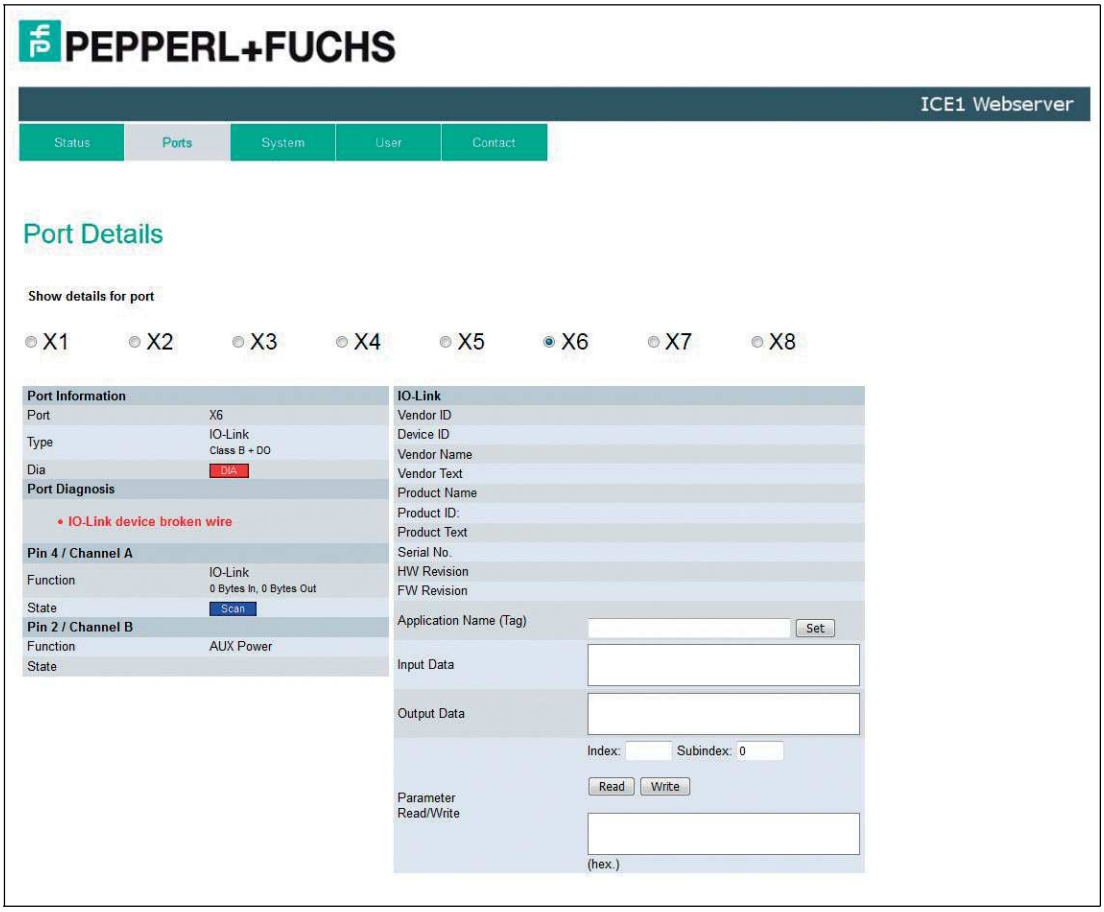



Figure 7.1

Diagnostic data is displayed in the "Port Diagnosis" area of the connection page, according to the connection.

## 7.2 Alarm Signals and Error Messages from Modules via PROFINET

**Note**

Alarm signals and error messages are only transmitted via PROFINET if the parameter for diagnosis is activated in the controller when the modules are configured.

If the modules detect a fault state, they trigger an alarm signal. The modules support diagnostic alarms. Diagnostic alarms are triggered by periphery faults, such as overloads, short circuits, and low voltage.

An alarm is triggered both by incoming events (e.g., sensor short circuits) and outgoing events.

The alarms are evaluated dependent on the PROFINET IO controller used.

## Evaluating Alarms in the TIA portal

If a diagnostics alarm is triggered, the user program in the TIA portal is interrupted and a diagnostics block is called. The following blocks are used:

| Cause | OB call |
|---|---|
| Diagnostics alarm (short circuit, overload, wire break, low voltage on an I/O module) | OB82 |
| Failure of a station or a rack | OB86 |

The initial information regarding the cause and type of fault is provided by the OB called and its start information. More detailed information regarding the error event can be obtained in the error OB by calling RALRM_SFB [SFB54] (read supplementary alarm information). For this purpose, SFB 54 must called in every error OB.

If the error OB called does not exist in the CPU, the CPU switches into the STOP operating state.

## The Structure of the Diagnostics Data Records

Block version 0x0101 and the format identifier (USI, User Structure Identifier) 0x8000 are used to display the diagnostics data records.

The data values "ChannelNumber" and "ChannelError" contain the following values, depending on the error that has occurred:

| Type of error | Source of fault | Channel number | Error code |
|---|---|---|---|
| Undervoltage/overvoltage of sensor/system power supply | Module | 0x8000 (diagnosis not channel-specific) | 0x0002 |
| Auxiliary voltage/actuator voltage too low | Auxiliary voltage | 0x8000 (diagnosis not channel-specific) | 0x0103 |
| Overload/short circuit of the sensor supply | IO port (pin 1) | 0x01 to 0x08 | 0x01 |
| Port driver temperature excess | IO port (pin 1) | 0x01 to 0x08 | 0x0113 |
| Overload/short circuit of the digital 500 mA outputs | IO port (pin 4) | 0x01 to 0x08 | 0x010A |
| Overload/short circuit of the digital 2 A outputs | IO port (pin 2) | 0x05 - 0x08 | 0x0109 |
| Overload/short circuit of auxiliary power supply ($U_{Aux}$) at Class B port | IO port (pin 2) | 0x05 - 0x08 | 0x0108 |
| IO-Link C/Q Error | IO port (pin 4) | 0x01 - 0x08 | 0x0006 |
| IO-Link device diagnosis | IO-Link device | 0x01 - 0x08 | Dependent on the IO-Link device diagnosis Extended diagnosis: 0x9000 |

## Display of diagnosis in the TIA Portal

1. Select the faulty I/O module in the hardware manager and navigate to its device view.
2. Select the affected channel/the submodule.
3. Open the online diagnostics by right-clicking with the mouse and select the menu item "Online & diagnostics > Channel diagnostics."

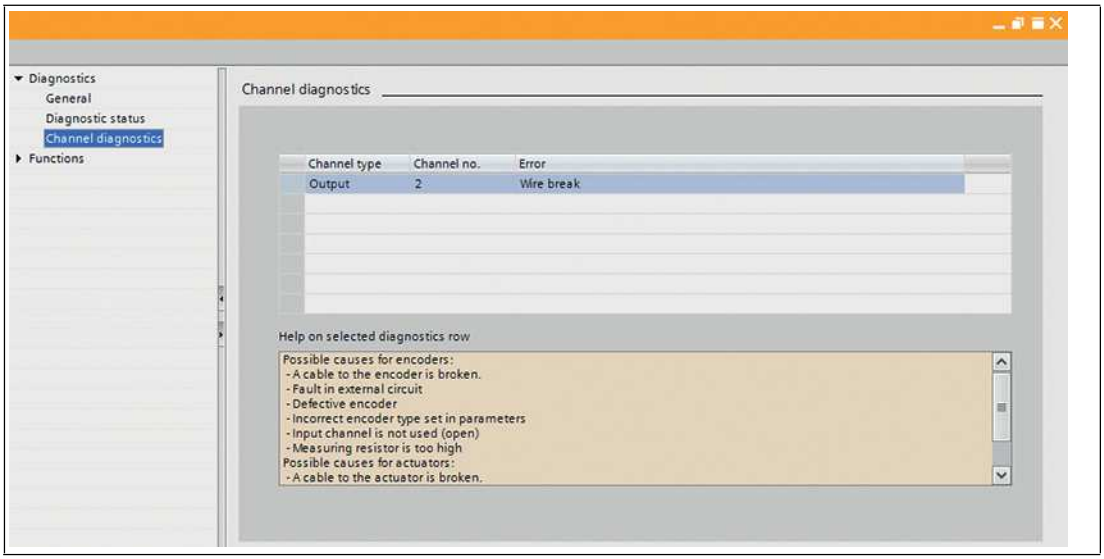



Figure 7.2

# Your automation, our passion.

## Explosion Protection

- Intrinsic Safety Barriers
- Signal Conditioners
- FieldConnex® Fieldbus
- Remote I/O Systems
- Electrical Ex Equipment
- Purge and Pressurization
- Industrial HMI
- Mobile Computing and Communications
- HART Interface Solutions
- Surge Protection
- Wireless Solutions
- Level Measurement

## Industrial Sensors

- Proximity Sensors
- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- Fieldbus Modules
- AS-Interface
- Identification Systems
- Displays and Signal Processing
- Connectivity

**Pepperl+Fuchs Quality**
Download our latest policy here:

**www.pepperl-fuchs.com/quality**

PEPPERL+FUCHS

**www.pepperl-fuchs.com**



Printed in Germany / DOCT-6686A